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ABSTRACT

The goal of this practicum was to involve parents in their children's mathematics learning. To accomplish this aim, efforts were made to improve children's performance and attitudes toward mathematics; to enable teachers to recognize the value of activities and games as an alternate to learning by rote; and to offer opportunities for parents to participate in workshops in order to obtain the knowledge necessary to help their children with mathematics, to explore various activities, and to have a hands-on experience with math materials to use at home. The implementation consisted of meeting with children in grades three through six to introduce them to exciting and stimulating math activities in order to show them that math can be an enjoyable subject. Six workshops for parents were designed to discuss pertinent information and mathematical activities they could use at home to improve their children's achievement and attitude towards math. Measurement of objectives was achieved by observation; the feedback of children, teachers, and parents; and responses to an evaluation form designed to reveal parental reactions to the program. Included are the introduction, study of the problem, anticipated outcomes and evaluation instruments, solution strategy, results, discussion, and recommendations. Appended are the evaluation forms, recommendations for parents, letters to parents, description of number tricks, sample of children's activity sheets, description of games played, sample of activity sheets distributed to parents, and math challenges.
(Author/KR)

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Developing and Implementing a Parental
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Susanne Goldberg

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A Practicum 1 Report Presented to the
Ed.D. Program in Child and Youth Studies
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Education

NOVA UNIVERSITY

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PRACTICUM APPROVAL SHEET

This practicum took place as described.

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November 8, 1990

This practicum report was submitted by Susanne Goldberg under the direction of the adviser listed below. It was submitted to the Ed.D. Program in Child and Youth Studies and approved in partial fulfillment of the requirements for the degree of Doctor of Education at Nova University.

November 20, 1990

Approved: _____

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ABSTRACT

Developing and Implementing a Parental Awareness Program to Enhance Children's Mathematics Performance and Attitude. Palm Beach County, Florida, 1990: Practicum I Report, Nova University, Ed.D. Program in Child and Youth Studies. Descriptors : Mathematics Education/Mathematics Achievement/Mathematics Skills/Parent Involvement/Parent Participation/Parent School Relationship/Parent Training/Workshops/Home Instruction for Parents/Homework/Arithmetic/Elementary School Mathematics

This practicum aimed to involve parents in their children's mathematics learning. The goals were to improve children's performance and attitudes toward mathematics, for teachers to recognize the value of activities and games as an alternate to learning by rote, and for parents to participate in workshops to obtain the knowledge necessary to help their children with mathematics, explore various activities, and have a hands-on experience with math materials to use at home.

The implementation consisted of meeting with children in grades three through six to introduce them to exciting and stimulating math activities to show them that math can be an enjoyable subject. Six workshops for parents were designed to discuss pertinent information and mathematical activities they could use at home to improve their children's achievement and attitude towards math. Measurement of objectives was achieved by the writer's observations, children's, teachers', and parents' feedback, and responses to an evaluation form designed to reveal parental reactions to the program.

Outcomes of this practicum were very positive. All five objectives were reached successfully. The overall results show the following: (a) Children should be properly motivated in math and exposed to mathematics as a positive; enjoyable subject in which they can succeed; (b) teachers should be kept abreast of new methods of teaching math, given opportunities to explore them, and interact professionally with other teachers in the field; (c) parents should be involved in the education of their children; (d) workshops can increase their knowledge of how to help their children; (e) children whose parents participate and become involved usually show higher performance and a healthier attitude toward their school work.

CHAPTER 1

INTRODUCTION

Description of Work Setting and Community

The school in which the writer did the implementation of her practicum is a well established private school in a rapidly expanding community. The continuing increase in population is due to many factors. It is located in the south and has had a large influx of people from colder climates. It also attracts many foreigners who influence the community. There are large business corporations who have relocated, and stores which have opened branches in a new shopping mall. The ever increasing business opportunities are attracting many young people with families.

There is a diversity of background of people living in this community. Although the majority are middle class home owners, there are many in the extremes, from low socio-economic to the very wealthy.

It is in this setting that the private, independent school is located. It has a campus of fifteen acres which houses five educational buildings and extensive recreational facilities. It is a coeducational K-8 school with provision for pre-schoolers as well. Three and four year olds have an interesting, well supervised program of their own. Class size is limited to twenty students with a teacher/student ratio of approximately one to ten.

In the lower grades, the emphasis is on the three R's with some exposure to science and social studies. The upper grades study math, English, science, and history. A foreign language, (choice of Spanish or French) is started at the kindergarten level. In addition to these academic subjects, music, library, art, and physical education are included. The school offers an excellent academic program that meets the needs of the students. There are extra curriculum programs such as student council, yearbook, cheer leading, sports, etc. which provide something of interest for everyone.

The school is non-sectarian. It does not discriminate on the basis of race, color, ethnic origin, or religious preference. Students of all backgrounds and abilities are welcomed.

Writer's Work Setting and Role

The writer is an experienced teacher who loves children, enjoys teaching, and participates in the world of academia. She is a graduate of the School of Commerce, New York University, where she received a Bachelor of Science Degree. Three years later, she obtained a Master of Arts Degree in Educational Psychology from Teachers' College, Columbia University. She also did graduate work at New Paltz Teachers' College, New Paltz, N.Y.

She started her career at Drake's School teaching bookkeeping and business machines. Her next position was at Strubenmueller's High School (New York City Board of Education) where she worked in the accounting department. In 1956, she moved to Plainview, New York, where she taught in the Plainview Old-Bethpage School District for twenty-eight years. Besides teaching, she had a variety of experiences as she was involved in many educational innovations. This period underwent many school reforms: team teaching, individualized programs, new math, open classroom, etc. She developed and wrote the CAM (Computerized Achievement Monitoring) program for her school. She later served as consultant in organizing and developing the mathematics

CAM program in the Mineola School District, Mineola, N.Y. Several schools in Orange County, N.J. invited her to address their faculty on the development and implementation of an individualized mathematics program. The writer participated in these varied programs and found them to be exciting and challenging. In 1972, she authored the first of five math kits, Practical Math - Addition. This was followed by: Practical Math - Subtraction, Practical Math - Multiplication, and Practical Math - Division, published by Benefic Press, (Westchester, Illinois). The fifth kit, Practical Math - Fractions and Decimals, was published by Coronado Press, (San Diego, California). These kits were distributed and sold nationally, and were popular and valued by teachers of mathematics during the era of individualized instruction.

The writer relocated in 1984 and is semi-retired. She does substitute teaching and enjoys the variety, challenge, and freedom this allows her. She is currently working toward her Doctorate in Child and Youth Studies.

CHAPTER II

STUDY OF THE PROBLEM

Problem Description

Children's attitudes towards mathematics often need improvement, while teachers need to recognize the value of activities and games as an alternative to learning by rote. Children frequently need help at home with their math, but, unfortunately, cannot get it. Parents wish to help and become frustrated because they are unable to do so. It is difficult when a child asks for assistance and the parent is unable to give it. Many parents are at a loss when trying to help their children. The problem then is to improve children's attitudes, enhance teachers' methodology, and inform parents of what they can do and show them how to do it.

Problem Documentation

This is a universal problem encountered by teachers of math, expressed and discussed at parent teacher conferences, and recognized by principals, department chairmen, administrators, and other experts in the field. During the writer's thirty years of teaching, she was frequently confronted by parents

asking what they could do to help their child. There is no doubt they want to help their children but do not know how to go about it.

The study of mathematics sometimes has a negative implication. Children tend to think of math as a dull and boring subject which is required but one they do not particularly enjoy. As a result, they do poorly and require help at home.

There is sufficient documentation. The literature is overwhelming with studies of the problem. There has been much material published and many strategies used. This is shown in many ways with unique approaches and suggestions for resolving it.

Causative Analysis

Why is this such a severe problem? A close look reveals many causes. There are numerous reasons parents are unable to help. They may not be familiar with the current mathematics curriculum, the methods used today, or how to approach the topic. Children look to their parents for help at home for reinforcement of what they were taught at school. Either they do not understand the math work and need help, or after an absence, they find it difficult to make up the work missed.

Foremost is the fact that parents do not remember their mathematics. This is a subject they may have

learned when they went to school, and unless used frequently, forgotten the principles they would need to explain it to their child. Through the years methodology has undergone many changes. A parent may subtract and divide by an entirely different method than the one being taught today. When parents show how they arrived at an answer, the child usually becomes confused and is worse off than if the parent didn't try to help at all.

Some parents know their math but cannot explain it. Either they can't bring their knowledge down to the child's level, or they have no patience to explain very simple processes.

Another significant cause of the problem is the parents' attitude towards mathematics. There are many people who are actually afraid of mathematics. Whatever the reason, their fear develops into math anxiety. Frequently, this anxiety is passed on to the child. Children are quite sensitive and they can easily sense the fear shown by the parent, and without realizing it develop their own fear of math.

Although the computation is the same, math terminology has changed through the years. Expressions such as sets, properties of a number, associative or distributive principles, the zero factor, or one identity are among the terms that are unfamiliar to

many parents. When children ask about these, or use them in their questions, parents are at a loss. Also, the inclusion of many new topics which were not considered in the elementary grades when parents went to school are now part of the mathematics curriculum. This refers to the understanding and use of the metric system, probability, grids, flowcharts, input-output factors, prime numbers, binary numbers, as well as number bases other than ten. These are areas that parents never learned or forgot due to lack of use.

Parents cannot help their children unless they are well-informed and feel comfortable with mathematics.

Relationship of the Problem to the Literature

Professionals in the field, as well as teachers and administrators, have written about the need and benefits of parents becoming involved in helping their children with math. The National Council of Teachers of Mathematics, in their 1983 bulletin, states that "children look to their parents for help in math.

It is evident that this problem is prevalent in schools throughout the nation. Studies indicate that students whose parents do not get involved do not do as well as children who get help at home. Buchanan (1969) shows that when parents are involved in their child's

school work, the performance and attitude towards mathematics improves.

A very helpful pamphlet on problem solving was distributed by the National Council of Teachers of Mathematics in 1982. It is entitled "Elementary School Mathematics: What Parents Should Know About.... Problem Solving" by Barbara Reys. In it she states that a parent's attitude and interest will greatly influence a child's attitude and interest in learning. It is designed to help parents become aware of the many opportunities to develop, nurture, and refine their child's math skills and to participate in the learning process.

The need for parents to help children with their math is recognized by Robert J. Sovchik (1980). He developed a device that parents can use to help their children practice basic skills. His article "Cal, the Calculator, Can Help Parents Become Involved" appeared in the Arithmetic Teacher journal.

In 1988, Fox emphasized the importance of parental involvement and suggests that parents use board games to improve their child's basic math skills. She offers suggestions on how parents can help to improve skills.

Joanne Cohn in 1988 stressed the significance of a parent's role in a child's learning process. Her article, "Tutoring Your Child", advises parents how to

tutor their children. She recommends parents remain positive and patient, be aware of the child's feelings, keep the tutoring time short, select a quiet place away from distractions, and use games and manipulative objects rather than abstract experiences.

Flexer and Topping (1988) offer suggestions for getting the message to parents about the need for helping their children with mathematics. Their article, "Mathematics on the Home Front" explains the goals of math activities at home and describes what parents should provide.

Recognizing a need for parental involvement, South Carolina State Department of Education (1979) sent learning materials home to parents to help their children with mathematical skills. Teachers sent home pages containing activities for skills currently being studied in which children need reinforcement.

Research Assessment Management, Inc. (1982) met this need by offering suggestions of things parents can do at home. They produced, "Parents - A Basic Skills Sourcebook" which discusses specific skills appropriate for children in various age groups. There are descriptions of activities parents can do at home with their children and a list of resource material. Further evidence of this is shown in "Hip Pocket Math" (1978) where materials to reinforce math skills

taught in the classroom are described. In this article, author, Dorothy Zjawin, describes math games for parents to use at home with their children to reinforce math skills taught in the classroom. Areas covered are: sorting and counting, number recognition, shapes, basic skills, measuring, and problem solving. The information is clearly explained and extremely helpful for parents.

The need for involving parents in math education is stressed in the Arithmetic Teacher (1988) in an article titled "Math Tips for Parents of Young Children". In this article, Helen Featherstone's research findings indicate that homework gives parents a window on their children's schoolwork and that some families reshape their activities around homework. It is therefore essential for parents to be well-informed and familiar with the math their child is learning.

An information booklet for parents is available from the New Jersey State Department of Education (1984). It offers suggestions as to how parents can support their child's educational development. Guidelines are provided to assist parents in supporting and reinforcing the school's role. Included in the booklet are activities for developing basic skills in math and a list of suggested supplies to have in the home.

The Des Moines Public Schools issued a booklet, "Home is for Helping" in 1980. It is designed for parents and offers ideas for utilizing everyday situations in the home to help children improve in school. Activities are offered that will help children to understand time, measurement, money, and math facts. Suggestions are also given for games and materials in the home that can be used with other activities for learning.

Marlow Eiger wrote a paper for parents entitled "Helping Your Child Achieve in School" (1986). In it the author focuses on ways parents can help their pre-school and elementary school age children acquire basic skills in mathematics. Cooperation between parents and teachers is emphasized. Ways parents can help their children achieve are suggested.

Ann Kahn, in the October of 1987 issue of P.T.A. Today, claims that regardless of career choice, all students will need to be powerful mathematically to participate in daily living. How parents can help their children prepare for the future is discussed. The need for parents to encourage success in math is emphasized.

Summary

There is certainly sufficient documentation of the problem. The literature is overwhelming with studies reported, materials published, and strategies used. From the literature reviewed certain basic facts can be ascertained: (a) There is no doubt of the need for parental involvement; (b) schools are sending math materials for parents to use with their children; (c) parents need to keep up with latest trends in mathematics; (d) children look to their parents for assistance with assignments or in preparation for a test; (e) children whose parents are involved achieve higher academically; (f) parents with positive attitudes pass this on to their children who in turn develop a healthier attitude toward their work resulting in an improved self-image.

These facts have been clearly expressed by several authors in journals, pamphlets, magazines, books, government reports, etc. There is no doubt of the need for parents to help their children and the need for parents to be informed about how to do so.

CHAPTER 111

ANTICIPATED OUTCOMES AND EVALUATION INSTRUMENTS

GOALS And Expectations

The writer's goal was to develop and implement a program for parents to enable them to help their children at home. She also wanted to be instrumental in making children and parents realize that "math can be fun". This would be achieved by offering information parents could use and combining this with a variety of math materials. Children will become enthused about math and realize it is not as difficult as they had thought. Teachers will enhance their knowledge, and parents be better prepared to help their children at home. It was the writer's intent to assist the parents in every way possible.

The writer aimed to change children's negative attitudes toward math by having them experience activities that make math "come alive". Enthusiasm was created by showing math as an enjoyable subject. The results aimed at an improvement in performance as well as attitude.

Behavioral Objectives

The following goals and objectives were projected for this practicum:

1. Children will participate in stimulating and challenging math activities that will improve their attitude toward math.
2. Teachers will recognize that many exciting activities and games can be used in place of learning by rote to build interest and feeling for math.
3. Parents will participate in workshops to obtain knowledge necessary to help their children with mathematics.
4. Parents will explore math as a family activity to improve their child's math performance and attitude.
5. Parents will participate in a hands-on experience with math materials to use at home.

Measurement of Objectives

Children's remarks and the writer's observations were used to measure Objective One. Comments by the children were made to both the teachers and the writer. Writer observed the students' enthusiasm and interest in what we were doing. Their eagerness and excitement were indicative of a positive and healthy attitude towards mathematics.

Objective Two was measured by the classroom teachers' reactions. These were evaluated by the writer during interviews and discussions after the presentations.

Objectives Three, Four, and Five , pertaining to parental participation and use of math materials, were evaluated by several methods. One source was the writer's observations and oral comments made by the parents. At the end of each session there were opportunities for parents and workshop leader to discuss the material presented. The writer received positive feedback.

Also an evaluation form (See Appendix A) was distributed to each parent. It was designed to obtain information such as what was most interesting, informative, enjoyable, and helpful. They also had an

opportunity to rate certain aspects of the program such as the information discussed, materials used, and relevance to their child's work. Pertinent questions relating to their participation in the workshops and the program itself were included thus providing parents with a structure to express their reactions.

CHAPTER IV

SOLUTION STRATEGY

Discussion and Evaluation of Possible Solutions

From the literature reviewed there is no doubt that the problem of showing parents how to help their child with mathematics is a very prevalent one. The preliminary literature review revealed an awareness of the problem, and a variety of activities that parents could use to overcome it.

Cohn (1988) stressed the importance of a parent's role in a child's learning process and offered advice for parents. In 1978, Hughes designed a program he called, "Rx: Home Remedial" which helped parents to work with their children. He also made suggestions for helping them, especially in problem solving, by reading math with children.

The Appalachia Educational Laboratory in Charleston, West Virginia (1985) published a booklet describing research which shows students perform better in school when parents support teachers and become

involved. Their surveys indicate that many parents interested in helping their children are inadequately prepared. They distributed brochures offering many valuable suggestions for parents to use.

At the Annual Meeting of the American Sociological Association in August 1985, Wiedman and La Mahien presented a paper on the MAP-At-Home (Monitoring Achievement in Pittsburgh) Program. It showed the results of a survey of 125 parents of elementary and middle school children who participated in the MAP-AT-HOME Program which focuses on helping parents to reinforce student acquisition of math skills. Participants used the materials at home and found them understandable, easy to use, and enjoyed by their children. Parents were enthusiastic about the contributions the program made to their children's knowledge of mathematics.

Many districts have published materials for parents specifically. The Louisiana State Department of Education (1982) distributed a booklet which includes a variety of math activities. Similarly, South Carolina State Department of Education, Columbia, S.C. (1979) developed and sent home a collection of learning activities and games to help reinforce students' mathematical skills and to enhance parental involvement. The Department of Education, Washington, D.C. (1982)

developed a sourcebook which presents an opportunity for parents to become educators of their children. It offers suggestions for initiating and continuing with the basic education of their children in grades one through eight. New York State Education Department, Albany, N.Y. (1974) also produced a guide designed to develop children's math skills by introducing parents to a number of learning activities for implementation at home.

Many interesting and unique approaches have been tried. The Hampton City Schools in Virginia (1987) developed a Math-By-Mail program designed to help students from grades five through seven who were working at or slightly below grade level maintain their math skills. Nine home-study packets containing two to four lessons each were sent home. Parents made a commitment to supervise the home study. Results have been favorable.

Homework is a controversial issue which has many people for and against it. A study by Mucha (1987) examined the academic and attitudinal effects of a Mathematics Homework Program on second grade students. The program was developed around math games and stressed parent participation. An analysis examined the correlation between attitudes, parental involvement, and mathematics achievement. Results showed that

children whose parents were actively involved in their child's homework registered gains in attitude and achievement levels.

Levy (1984) designed a booklet for use with elementary school children that can be used both at home and school. Parents using this material found it extremely beneficial. Excellent materials for parents were also designed by the Wichita Unified School District 259 (1979). These were developed to help parents in the primary-level mathematics instruction of their children at home. The activities described are aimed at strengthening basic skills by an informal, outgoing, repetitious, and fun orientation program. Parents were provided with worksheets and materials for many of the activities.

Three programs relating to this problem are extremely interesting. Hughes presented a paper at the Third Annual Meeting of the Parents and Reading Conference in New York City (Feb. 1978) in which he claims some difficulties children have with math are related to reading problems. He further claims that the ability to read mathematics is a specialty which can be taught by teachers and parents. Parents can begin early to help their children by reading them stories and poems related to numbers and mathematics. This will be of value for problem solving in the future.

Forsyth County-Winston Salem City School, N.C. (1976) issued a booklet answering questions from parents about the metric system by presenting a concise overview. Few parents know or understand the Metric System and therefore would benefit from information in this area.

The third is a guide issued by the New York State Education Department (1974) describing a parent education course designed to develop the math skills of elementary school children by introducing parents to a number of learning activities suitable for home implementation. The focus is on how the parent can help a child do his best in school.

Buchanan's (1969) article on the "Effects of Arithmetic Homework Upon the Attitudes and Achievements of Fourth, Fifth, and Sixth Grade Pupils" explained an experiment involving parents in a homework treatment program. It was designed to study if there would be any significant improvement in performance among those receiving homework as contrasted with the no homework group. The study involved 417 students with three treatment plans; one group had no homework, the second group had knowledge of results after each problem (child did one example at a time, correct answer was given before proceeding to next example), the third group had delayed knowledge (answers were

given when all work was completed). The results were quite interesting. They showed that homework, combined with parental involvement, does have a significant effect upon both computational and problem solving performance. The involvement resulted in the parents becoming aware of the strengths and weaknesses of their child's mathematical competencies. Another advantage was that pupils consistently completed their assignments.

"Mathematics on the Home Front" (Flexer and Topping, 1988) mentioned three methods of getting messages about math to parents. They are: 1) sending information through newsletters, 2) bringing parents to school for meetings, and 3) sending instructional materials and directions home with the child.

Description of Selected Solution

The writer agrees with the preceding suggestions and recommendations. They all have merit and attempt to solve the problem. However she developed and used strategies of her own as she worked with children, teachers, and parents. She met with the third through sixth grade classes and spent approximately an hour with each group at three different times. This served as an introduction to the work she planned to do with

the parents. During the sessions with the students, she explained the purpose of her project, aroused their interest, and created enthusiasm. Her overall objective was for the children to realize there are many helpful hints which can help them with their work and that learning mathematics can be fun.

Prior to meeting with the children, each teacher was given the writer's resume' (See Appendix B). This enabled the classroom teacher to learn something about the writer's background, helped them be more inclined to cooperate, and to take an interest in the program. Teachers frequently become so intent on teaching the objectives and covering the curriculum they overlook the "fun" part of teaching.

Children were involved in many activities and games which could be used in place of the "paper and pencil" rote learning. Teachers were encouraged to use these math activities with their students after the session was over.

The writer also developed activities for parents to use with their children. These activities, rather than being sent home, were tried and explained at workshops for parents. The rationale for this is quite evident. Papers a child brings home from school may be casually looked at or put aside for some future time. They may be glanced at and forgotten. The value of

material sent home, is lost. By using the same or similar materials at a workshop the parents actually saw how they could be used. Together with other parents, under the direction of a trained person, the benefits were significantly better.

Several workshops were conducted for the parents. They consisted of important information pertaining to curriculum items such as terminology, algorithms, number theory, and specific operational methods (short cuts, number families, relationships).

Stimulating and challenging math activities for parents to use with their children were distributed and explained. As previously stated, it is the writer's thinking that just handing a sheet of paper to a parent is not as effective as explaining or discussing the items presented. Once there was interaction between parent and writer, the benefit from the use of each suggestion or recommendation was enhanced.

Activities at the workshops offering parents a hands-on experience were demonstrated. Materials reviewed the information parents need to help their children. Then when children go to them for math help, parents will feel more competent helping them. Each person present was given a "Math Tips for Parents" sheet with eight specific recommendations for working with their child. Also distributed was a sheet

entitled, "As You Work With Your Child in Math" (See Appendix C). This offers a list of do's and don't's for parents and serves as a guideline for working at home.

Math as a family activity was explored. Games which could be played at home were explained. There were a variety of games, some for one or two players, others for several players. There were also games that could be used on car trips or when traveling. A number of games useful for reinforcing math skills are entertaining and fun, yet of significant educational value. Some games can be purchased; many can be made at home, and still others can be played with little or no materials. The writer explained some of these games and encouraged the parents to play them at home with their children. She believes that family activities have much value and should be encouraged.

The writer was prepared to try many procedures. By conducting workshops for parents she supplied them with math information and materials they could use. It is her belief that her strategy worked because many parents were interested in helping their children but did not know how to proceed. As a result of her sessions with parents they have a better knowledge of mathematics and felt more comfortable with it. The workshops introduced them to math activities appropriate for home use. There were handouts to

reinforce what was explained. Parents were given a list of recommendations for working with their children. It is the writer's belief that if people leave a workshop with materials, the experience becomes more meaningful and the potential for carryover is greater. She believes these strategies were effective in solving the problem.

Report of Action Taken

The writer used her strategy for solving the problem by meeting with the children in grades three through six and conducting workshops for the parents. Her objective in meeting with the students was to show them that mathematics need not be a dull, boring subject, but could be fun. By so doing she accomplished two things: arousing their interest and indirectly using them as emissaries to their parents. They were given activities that were explained in class and could be completed at home at their leisure. Letters were sent home with them. (See Appendix D). A letter was sent at the beginning of the program, in April of 1990, informing parents of the workshops, together with a 'resume' of the writer so they would have an idea of the background and qualifications of the person conducting the sessions. It also included the dates for the

workshops. Another letter was sent in September, 1990, when school resumed after the summer vacation. This notified parents of the dates and what was to be discussed at each meeting. A response form was included to give the writer an indication of how many parents planned to attend each time. By so doing, the writer involved both children and parents, stimulated their interest and publicized her program.

When meeting with the students, the writer used a format which she found to be successful in that it held their attention and interest, and made them realize that math could be an enjoyable subject.

First she started with number tricks which the children found fascinating. By performing a few operations, she would guess their age, or any two digit number they chose. Another trick showed that whatever number they started with, after simple computations, the answer would always be three. (See Appendix E for description of number tricks). These tricks helped to relax the students, set the atmosphere, and made them realize this was a different kind of math lesson.

The number tricks were followed by ways of computing other than the conventional method. Alternate methods were shown and helpful hints given. For addition, adding by endings and expanded notation were illustrated and recommended. Subtraction hints were

given, especially for renaming when several zeroes are involved.

Many multiplication shortcuts were shown which are very helpful and not always taught. The unique features of nine, such as the sum of the digits of a multiple of nine always adding up to nine, and the simple way of checking answers by casting nines, were explained and tried.

A rapid way of multiplying by eleven never ceases to fascinate children. Numbers one through nine when multiplied by eleven are doubled. For numbers ten to ninety-nine, the product is arrived at by placing the first digit in the hundreds column, the sum of the two digits in the tens column, and the ones digit in the ones column. By using this method the answer can be arrived at instantaneously. Another feature of multiplication is the odd and even factors. (Two even numbers always have an even number as their product, two odd numbers always have an odd number as their product, an odd and an even number always have an even number as their product).

Certain key facts make division easier. There are helpful hints for dividing by certain numbers. These were explained to the students. All the shortcuts and hints given were useful in doing their calculations.

Only part of the period was spent on this as time was needed for distribution and explanation of activity sheets and playing a game.

At each session, three to four activity sheets were presented. These were challenging, stimulating and enjoyable activities. Some were the simple connect-a-dot type but with unusual pictures as a result, some used a code to find a secret message, others were riddles, mazes, number crosswords, or puzzles. There were a variety of activities using math skills, appealing to children of all interests. These activities were not randomly chosen, but selected with much thought and purpose. The simpler ones ("Raining a Number of Things", "Knock Them Down", and "Pizza Race") gained the children's confidence, made them feel successful, and made them realize that math was not so bad or hard after all. (See Appendix F for samples of children's activity sheets).

The secret code worksheets ("The Xylophone", "Who Are They", "Number Riddles") were enjoyed by all the children. In the their anxiety to discover the message, they did not realize they were practicing their mathematical skills. Some of the messages are related to their social studies, such as the names of capitals, presidents, countries, etc. Others are proverbs or famous sayings, also correlated to their other

subjects. The puzzles ("The Odd Hat", "Puzzle Surprise", "Triangle Puzzles", "and The 1200 Diamond") were a challenge and required the children to use logic or reasoning. This is a skill greatly needed and frequently neglected.

The third and last part of her lesson was playing a math game. Several games were introduced depending on the grade level and the children's abilities. In Grades Three and Four, we played "Buzz" and "Human Tic-Ta-Toe"; Grades Five and Six played "Pica Fermi" and "Chip Trading". (Before introducing the game, "Chip Trading", the writer sought the headmaster's approval as it involves the use of poker chips and dice. As it is an educational game, there was absolutely no objection. (See Appendix G for description of these games).

All the games were enthusiastically received. Many students were sorry when the period was over and asked if they could play it again. The writer left this to the discretion of their teachers, all of whom said they would do so at some future time.

The format for the workshops was similar to that of the students. Parents were greeted and asked to sign in at which time they were given a colored folder in which to keep the materials to be distributed. (A sample folder is enclosed with the report).

The writer started the meeting with several number tricks which were well received and set the tone for a pleasant, relaxing evening. She then presented interesting information regarding mathematical terms, number theory, basic operations, problem solving strategies, and other topics of interest to parents.

During the presentations, whether with the children or parents, the writer always used an overhead projector. It is her firm belief that facing her audience is extremely important. Eye contact is much more effective than turning one's back to write on the chalkboard. From past experience she has found that the use of an overhead screen maintains the interest and holds the attention of the class. It is for this reason that she used it with the children as well as with the parents.

Three stages of working with numbers were explained: the concrete, visual, and abstract. Recommendations were made for the child to use the discovery method. Mathematical terms such as number families, place value, relationships, (greater than, less than) patterns, expanded notation, renaming, etc. were explained. Specific math terms used for each operation were discussed. The same helpful hints for the four operations given to the children when the writer met with them were explained to the parents.

In addition, an explanation of the associative or grouping property, and commutative or order property, was given. The use of key facts for adding by endings, column addition, and higher decade addition were illustrated. Casting nines was shown as an interesting method of checking answers.

Subtraction was discussed as the inverse of addition and its role in number families. Renaming with emphasis on zeroes in subtraction was explored.

Some of the unique features of multiplication were called to the parents' attention. The role of nine and eleven as factors were explained similar to the illustrations given to the children. Simple ways of multiplying by tens, hundreds, and thousands were shown, and the odd and even factors as predeterminent to odd or even products were demonstrated.

Division was introduced as the reciprocal of multiplication. It is thought of as the separation or splitting of things into equal parts; the mathematical operation of finding how many times one number or quantity is contained in another. Number endings were examined for its divisibility by certain numbers.

Special emphasis and more time was allotted to problem solving. From experience, the writer is aware that this is a very important skill which many children lack. Her intent is to eliminate anxiety so that the

parent knows how to help the child in getting started and how to approach the problem. She thus introduced problem solving as pretending to be a detective.

An analogy was made of steps taken by a detective and those needed in solving a mathematical problem. The six steps are as follows:

1. Define the problem.
2. Examine the facts.
3. Look for clues.
4. Reason it out.
5. Find the solution.
6. Check the solution.

After explaining the procedure for solving math problems, the writer then gave the parents several clues which would identify which of the four operations is required. The clues are:

Key Words

Addition: sum, all together, united, joined,
total, in all, together, also,
plus, in addition to

Subtraction: difference, remainder, left , left
over, more, less, take away

Multiplication: product, amount of one given, find
amount for more than one of the same

Division: quotient, sharing, splitting,
dividing, amount from many to find
out amount per unit

Following the explanation, a variety of activity sheets were distributed and discussed. (See Appendix H for activity sheets distributed to parents). There were at least five to six activities at each session with a vast scope and range of things to do. Something parents liked and said they would use in their children's room is the "Math Mobile". A simple construction made of wire hangers, paper circles, and string can decorate a room and yet be helpful in learning basic math facts. "Tic-Ta-Toe" and "Break the Code" are two of the many decoding activities explained. For the puzzle lovers, there were several interesting activities, two of which "Where's the Money" and "Three in a Row" are illustrated in Appendix H.

At the problem solving session, a folder with ten activity sheets was distributed. These were problems

relating to a number of life experiences, such as shopping in a supermarket, purchasing school supplies, planning for a trip, keeping score at a sport's event, spending at a fair, etc. Four of these, "Trading Time", "Recycling Pays", "The Birthday Present", and "Jiff at the Gym" are typical of the activity sheets distributed. These relate to experiences children are familiar with or actually have had. Because of their appeal and high interest level, children in their anxiety to complete the activity do not realize they are "doing" math.

Some of the games were explained and tried by the adults. "Pico Fermi" (See Appendix G) seemed to make a big hit as it was easy to try and enjoyed by all. Everyone agreed "Chip Trading" was an excellent game especially when learning bases other than the decimal system. Parents appreciated the suggestions for simple games that could be played at children's parties, on an outing, or on a motor or plane trip.

A question and answer period was made available at the conclusion of each workshop. This provided parents an opportunity to exchange ideas, comment on the information and materials received, and interact with each other and the writer.

The strategies the writer used with children as well as parents were successful. She had sufficient

variety and appealing activities to hold their interest. The information presented to the parents was greatly appreciated and of value in helping their child with math. The folders with the materials distributed gave the parents something tangible to keep for participating. It is the writer's belief that the knowledge gained by the parents at these workshops led to a successful solution of the problem.

Chapter V

RESULTS, DISCUSSIONS, AND RECOMMENDATIONS

Results

There is a definite need for parents to help their children with mathematics but unfortunately many parents are unable to do so. The reasons for this are varied and have been discussed. The writer used several strategies as a solution to the problem. She met with students from grades three through six to motivate and inspire them and through them reach their parents.

She also conducted evening workshops for the parents. At these workshops she introduced number tricks, illustrated pertinent mathematical information, distributed and discussed numerous activities, and explained math games they would use at home with their children. The results were most rewarding.

The first objective, "Children will participate in stimulating and challenging mathematical activities that will improve their attitude toward math" was met.

During her sessions with the children she noticed that the children were enthused, excited, anxious to

participate, and sorry when the lessons were over. Remarks such as, "Do you have to go?" "Couldn't we do this a little longer?" "This was fun!" "Are you coming back?" were prevalent throughout. One little girl approached the writer and said, "I wish you could be our math teacher all the time." These comments from children indicated that they enjoyed the stimulating and challenging activities presented and were certainly indicative of a positive attitude towards math.

Objective two, "Teachers will recognize that many exciting activities and games can be used in place of learning by rote to build interest and feeling for math" was successfully achieved. Teachers were impressed with what they saw. Any anxiety they may have had of a stranger walking into their classroom and teaching their class was allayed after the first few minutes. The writer thanked them for inviting her to the class and asked them to participate in the activities if they so wished. As a result, the teachers relaxed and enjoyed the experience, realized the value of the presentation, and promised to follow through on some of the activities. This was especially important because the writer introduced several math games which the children enjoyed so much that they did not want the period to end. Each of the teachers said they would play these games with their classes and thanked the writer for coming.

Objective three, "Parents will participate in workshops to obtain knowledge necessary to help their children with math" was also successful. Parents attended the workshops to learn what they could do to help their child.

The writer noticed that parents were interested in the information presented, impressed with the materials distributed, and asked many interesting and pertinent questions. The factual information presented was accepted very positively. They especially liked the analogy of problem solving to detecting and expressed their intention of using it with their children.

Objective four, "Parents will explore math as a family activity to improve their child's math performance and attitude" was also met. Many activities and games were explained. The feedback was most positive. Parents claimed they definitely intend to play these games with their children at home. During one session we played "Pico Fermi". The adults enjoyed the game and realized its value for helping children to practice their reasoning power and use of logic.

Objective five, "Parents participated in a hands-on-experience with math materials to use at home" was achieved. A variety of activity sheets were distributed for parents to use. They were very impressed with the activities the writer gave them and pleased they had

something to take home. One parent thought they were so good that she asked the writer why she did not put them in a book and publish it so other parents could use them. Comments from parents were all positive.

In addition, parents were asked to complete an evaluation form. This form was developed to obtain parents' reactions. Inquiries referred to what they found most informative, interesting, enjoyable, and helpful. The results to question one showed:

most informative: specific facts about each of the
operations

most interesting: problem solving analogy to
detective work

most helpful: activity sheets to take home and
lists of helpful hints

most enjoyable: number tricks and games

The answers to questions two and three, relating to use of materials at home, were "Yes". In question four, six items were rated on a basis of (1) great value or (2) little value. All responses rated them one. Replies to questions five, six, and seven were "Yes". Answers to questions eight and nine varied but in keeping with the above.

The overall reactions showed the following:

1. Parents plan to use activities and games with their children.
2. Participation in the program helped parents gain valuable information.
3. Parents thought their participation in the program would help their children with their math.
4. Many parents would like to see the program continued and/or repeated.

The responses to the evaluation form, combined with the children's comments, teachers' reactions, parental feedback, and writer's observations indicated the objectives were met and the effectiveness of the program was beyond question.

Discussion

The writer is pleased with the results of her program. She was well aware of the problem from her years of teaching experience, but her position was reinforced by the numerous articles confirming the existence of the problem. In June of 1968, Buchanan discussed the effects of increased home-school contact on performance and attitudes in mathematics. He was not alone. The Des Moines Public Schools in 1988 claimed

that home is for helping. In the same year, Cohn wrote about tutoring your child, and Maron in 1985 explained how to help your child as a learner.

Realizing the need for informing parents of what they can do to help their child, the writer planned the workshop sessions. She was able to present the parents with pertinent math information, show them a number of activities they can use with their child, and games that could be played at home with the family. This is in keeping with Fox's (1988) "Great Games" and Caldwell's (1988) "Families Tackle Math as a Game Together".

Both South Carolina and Virginia State Departments of Education referred to mathematic activities for parents to use. The writer found the parents very receptive to the activities she distributed. They felt the activities were interesting and would appeal to their children.

The writer was aware of this because she used similar activity sheets with the students when she met with them. They enjoyed the surprises they found after completing the activity and the challenges they presented. This was true of all with one exception.

Through feedback from the headmaster she found out that one particular activity was too difficult for many of the students. As a challenge, she had prepared some

questions from previous Mathematical Olympiads.

(Olympiads were held once a month in several school districts in New York in average or above average math classes. (See Appendix I for sample copy of Math Challenges.) Having had very successful experiences with the Olympiads in the past, the writer tried similar problems with the fifth and sixth graders. She was unaware that these children had no background for such problem solving exercises and as a result had difficulty trying to do them. After realizing this was far too advanced work for them (although fifth graders in Long Island, N.Y. found them fun to do), the writer changed her plan and eliminated any further Olympiad challenges from her program.

The writer was very flexible and adjusted her activities to meet the needs of her students. Another example of this was when she introduced the game "Human Tic-Tac-Toe". At first she used multiplication flashcards. When she noticed that many of the children were not responding correctly, she quickly changed it to addition. By so doing the children were then able to participate without frustration and enjoy the game.

Incidents such as these served as a formative evaluation. Based on the information she obtained while the program was in progress, she made the necessary

changes to meet the needs and abilities of her students. At all times she was prepared to make any adjustments as her implementation progressed.

When working with the parents she used the evaluation form to solicit responses so that the writer would be in a better position to adapt her program accordingly. All the questions asked on the evaluation form were informative for the writer and gave her an opportunity to judge whether the program was successful. During the implementation of the program it also served as a formative evaluation. At the completion, the information gathered would be a summative evaluation.

As stated in the 1982 National Council of Teachers of Mathematics, parents should know about elementary school math and especially problem solving. This the writer stressed in her workshop dealing with the difficulty children have with problem solving. In "Mathematics on the Home Front" (Flexer and Topping, 1988) instructional materials and directions were sent home with the child. This the writer did in addition to meeting with the parents.

The reactions of the children showed the writer that the activities she presented were met with overwhelming enthusiasm. The teachers seemed interested in what the writer was doing and promised to continue

after she left. This is especially true of the games played. They recognized the value of such games and informed the students in front of the writer that they would play them in the future.

There is no question in the mind of the writer that the sessions with the parents were successful. Those that attended found the meetings informative, shared interesting experiences, and claimed they were certainly worth their while.

In view of the above, there is no doubt that the program was a success. Children participated in stimulating and challenging activities which improved their attitude toward math. Teachers recognized that many exciting activities and games can be used in place of the conventional method of teaching. Parents participated in workshops where they obtained information necessary to help their children with math, received many interesting activities for their children to do at home and learned math games which they could play as a family. These reactions by the children, teachers, and parents prove that the objectives were met. As a result children's attitudes towards mathematics will improve, teachers will develop more rapport with their students, and parents will feel comfortable helping their children with their math work

Recommendations

From her experience in implementing the program the writer has several recommendations to make for parents, children, and teachers.

1. Parents should be involved in the education of their children. It is to their advantage to become well informed regarding what their child is learning in school and help them whenever warranted. Children of parents who participate and become involved in school matters usually show higher performance and a healthier attitude toward their school work.

2. Children should be properly motivated in math. They should be given an opportunity to do some hands-on activities and deviate from the paper and pencil rote learning. Stimulating, challenging activities should be presented to hold their interest and allow them to develop reasoning power and logic. They should be exposed to mathematics as a positive, enjoyable subject, one in which they can succeed.

3. Teachers should be kept abreast of new methods of teaching math. They should be given opportunities to meet with other math teachers to exchange ideas, discuss activities, and interact in a professional manner. There are many seminars and workshops in math

designed for teachers. The administration should encourage attendance at these meetings (and perhaps offer compensatory pay) so that their teachers can return to their classrooms revitalized, full of new ideas and ready to try something innovative. (The writer was most fortunate in attending several of these meetings and found them extremely interesting.)

The writer believes these recommendations would be most beneficial for parents, their children, and all teachers of math.

Dissemination

The writer has thought of several ways of disseminating the results of her practicum. As she is not affiliated with any one school, it is difficult to influence any of her professional colleagues. However, she has several other courses to follow.

She is seriously contemplating writing a book for parents. It would be written in laymen's language and would explain how parents can help their children with their math work. It is her belief there is a wide market for this type of how-to book and feels very strongly about writing it.

Another idea that the writer is considering is publishing activities similar to the ones she used in

her implementation. She is aware of the value of such activities. This was reinforced by a comment made by a parent who asked why the writer had not published these so that other parents throughout the country could profit from them.

The writer seriously intends to pursue both these undertakings and expects to get started in the very near future. She feels very optimistic about these endeavors, especially after completing her practicum. She is extremely enthused as it is her goal to make the study of mathematics interesting and rewarding, and above all, she would like to prove that "Math Can Be Fun". She believes mathematics is fascinating and agrees with Galileo who said, "Mathematics is the alphabet that God has written the universe with".

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APPENDIX A
EVALUATION FORM

Evaluation by Parents

1. What did you find:

most informative _____
 most interesting _____
 most enjoyable _____
 most helpful _____

2. Will you use any of the activities or games with your child? _____

3. Do you plan to use any in the near future? _____

4. How would you rate the following?

1. great value 2. little value

a. the information provided _____
 b. the materials used _____
 c. the workshop in general _____
 d. the time involved _____
 e. relevance to your child's work _____
 f. of help to your child _____

5. Did participation in the program help you?

6. Would participation in this program help your child? _____

7. Would you like to see this program repeated? _____

8. What changes would you like to see? _____

9. Please write your overall reaction to the project. Your comments, suggestions, and/or recommendations will be greatly appreciated.

APPENDIX B
RESUME' OF WRITER

Resume

Name: Susanne Goldberg
 Address: 6866 Huntington Ln., Delray Beach, Fl. 33446.
 Phone #: 407-496 4230.

Educational Background:

New York University: Bachelor of Science Degree
 Teachers' College, Columbia University: Master of Arts Degree
 New Paltz Teachers' College: Post-graduate Courses
 Nova University: Doctoral Student in Child & Youth Studies
 (at present time)

Teaching Experience:

Drake's Business School, N.Y.C., N.Y.	2 yrs.
N.Y.C. Board of Education	2 yrs.
Plainview Old-Bethpage School System	
Plainview, New York.	28 yrs.
Palm Beach County School System	5 yrs.
(Substitute Teacher)	

Other Allied Activities:

Developed an individualized math program for use in my class.
 It was later used by other teachers in the school. (1966).

Started team teaching and became team leader of a group of four. (1967-1971).

Ran an Open Classroom, with another teacher, which was used as a model for visitors in our district, as well as interested people outside our district. (1972-1976).

Conducted a Math Laboratory, and organized math labs for other teachers (1973-1978).

During Sabbatical (Spring semester, 1972) contacted schools in Metropolitan New York Area with outstanding math programs to observe them. I was a guest speaker (with honorarium) at several schools in Orange County, New Jersey, on organizing and implementing an individualized math program. I later did some consulting work for this district.

Authored 5 math kits distributed nationally, titled "Practical Math Kits".

Addition	Benefic Press	1972
Subtraction	Benefic Press	1974
Multiplication	Benefic Press	1976
Division	Benefic Press	1978
Fractions/Dec.	Coronado Pub.	1982

Developed and wrote CAM (Computerized Achievement Monitoring) Math Program for my school. (1976).

Served as consultant in organizing and developing CAM Math Program in Mineola School District in Mineola, New York.

APPENDIX C
RECOMMENDATIONS FOR PARENTS

MATH TIPS FOR PARENTS1. Look for mathematics in the environment.

Have your child read numbers on a license plate, find the price on a grocery item, name a coin, count items on the table, read the sport scores on television, or locate or find different shapes.

2. Use manipulatives.

Count using buttons, use craft sticks bundled into tens to teach the base ten system, "buy" with play or real money, play with a shape-sorting box, or use a pegboard to make or reproduce designs.

3. Praise your child's mathematics efforts.

Post math papers in the family display area, and verbally praise the use of mathematical skills. Make a chart with stars to show continued acquisition of math skills like addition and subtraction facts.

4. Encourage your child to do a lot of talking.

Prompt your child to think aloud, make predictions, and ask questions. Encourage your child to explain and discuss, not just name things. Be a good listener.

5. Hide your own math anxiety.

Try to remember how easily attitudes are passed on to your children.

6. Remember that young children do not stay with any adult imposed task very long.

Use short enjoyable mathematics games at home, like Quizmo, Numberland, or Number Bingo. They will be far more effective than a half-hour of fact drill. Make a "fact walk" using footprints drawn on self-adhesive paper. The child walks along and calls off answers while another child or parent checks.

7. Frequent repetition assists "overlearning."

Repeat material frequently, even when you think it is mastered. The child can become involved in his or her own progress by posting a chart and keeping track of scores. The simple act of charting is often itself a motivator.

8. Children's television can be a good mathematics reinforcer.

Take advantage of "Sesame Street" and other educational children's programs that contain some mathematical content appropriate for young children.

AS YOU WORK WITH YOUR CHILD IN MATH

DO

Help him see that math is very much a part of everyday living in work and play.

By all means, let him know when he has made a mistake. But do it in a positive way. Saying, "That was a good try but..." is much better than "That's wrong! Do it again!"

Try a short warm-up session first. Try to include an activity such as three very easy problems, that allow the child to have some success.

Keep the length of the activity reasonable.

Let him have an example to follow. This will help him think as he practices on his own.

Start with facts that the child is familiar with and gradually include something more difficult. Let him think of such material as a challenge or even as a bonus.

Give him lots of encouragement and praise for things he does well.

DON'T

Hurry the child into doing more than he is able.

Use the same activity over and over. The child will grow bored with it and see it as more work.

Force the child to memorize a lot of facts right away. Instead, work on just a few at a time until your child learns them. Gradually introduce new ones.

Make him write out examples on paper all of the time. Try substituting a different technique, such as drawing pictures of the problem and answer, collecting objects to form the answer, using calendar numbers, and so on. Limit problems to all easy or all difficult.

Compare his performance with other children.

Keep telling the child that you hated math when you were in school. Avoid giving him the impression that math is distasteful; he may enjoy math!

Worry if he doesn't seem to catch on right away. He may know more than either he or you realize.

Expect your child to explain his procedures. Intuitive answers are often hard to explain.

APPENDIX D
LETTERS TO PARENTS

Susanne Goldberg
6866 Huntington Lane
Delray Beach, Fl. 33446

April 18, 1990

Dear Parents,

Saint Joseph's Episcopal School, in cooperation with the Nova University Doctoral Program, is making available my services for parents of its students.

I am a retired teacher with over thirty years experience (resume' enclosed) whose primary interest is in math, and in showing parents what they can do to help their children at home with this subject. To accomplish this, I will be conducting several math workshops to which you are most cordially invited. The workshops will be held from 7 to 8 P.M. at Saint Joseph's Episcopal School on the following dates:

April 26

May 10

Sept. 19

Oct. 3

Oct. 10

Please reserve these dates. Mark them on your calendar so that you can participate in these interesting workshops. What you do to help your child now, like any good investment, will pay dividends in the future.

I look forward to meeting you and sharing math ideas and activities which will prove beneficial to you in helping your child at home with math.

Sincerely,

Susanne Goldberg
Susanne Goldberg

September 17, 1990

Dear Parents,

Welcome back to our new school year. Saint Joseph's Episcopal School is again offering free Math Workshops for parents to be held at the school from 7 P.M. to 8 P.M. on the following dates.

Three interesting evenings have been planned. They are September 26, October 3, and October 10. Please mark your calendar. These could be extremely important dates for you to keep open so that you can attend these workshops. It could mean a great deal to you and your child. By attending you will find out how to help your child with math and make his/her school year, and yours easier and more fruitful.

Workshop Programs

September 26

Problem Solving: a math skill children usually find difficult. Interesting information will be presented showing how problem solving can be made easy for your child.

Many suggestions for performing the basic operations of addition, subtraction, multiplication, and division will be given thus enabling you to help your child with his/her math work. Handouts of math activities will be distributed.

October 3

"The Metric System", the world is using it; the United States is going Metric, your child will be learning it; you should know it too. A clear simple way to understand it will be explained.

October 10

"Game Night", a fun evening for you and your child. There are many math games that can be played at home, while traveling, or at parties.

Bring your child with you for a parent-child evening of math fun and games.

Plan to be there!!!!

Sincerely,

Susanne Goldberg
Susanne Goldberg

APPENDIX E
DESCRIPTION OF NUMBER TRICKS

Number Tricks

1. Guessing a person's age or any number from 1 to 99

Step 1 Write age or any number from 1 to 99

Step 2 Double the number

Step 3 Add 6

Step 4 Ask for the answer

Step 5 Tell number started with

Solution:

To get the number, you divide the answer
by 2 then, subtract 3

11. Guessing any two digit number

Step 1 Select any two digit number

Step 2 Multiply it by 4

Step 3 Add 12

Step 4 Subtract 8

Step 5 Divide by 2

Step 6 Ask for answer

Step 7 Tell the number person started with

Solution:

To get the number, subtract 2 from the
answer, then divide by 2

III. Guessing the answer

Step 1 Pick a number

Step 2 Double it

Step 3 Add 9

Step 4 Subtract 3

Step 5 Divide by 2

Step 6 Subtract original number

Step 7 Tell answer: 3

Solution:

Answer will always be 3 no what number person started with.

IV. Guessing 2 numbers person selects

Step 1 Pick a number between 0 and 10

Step 2 Multiply it by 5

Step 3 Add 7 to your answer

Step 4 Multiply answer by 2

Step 5 Add any number between 0 and 10

Step 6 Subtract 3 from answer

Step 7 Ask for the final answer

Step 8 Tell the 2 numbers that were chosen

Solution:

Subtract 11 from the answer given. The number in the tens column is the first number; the number in the ones column is the second number selected.

V. Guessing year of birth and age

Step 1 Write year of birth

Step 2 Double it Step 3 Add 5

Step 4 Multiply by 50

Step 5 Add age to answer

Step 6 Add 365

Step 7 Subtract 615

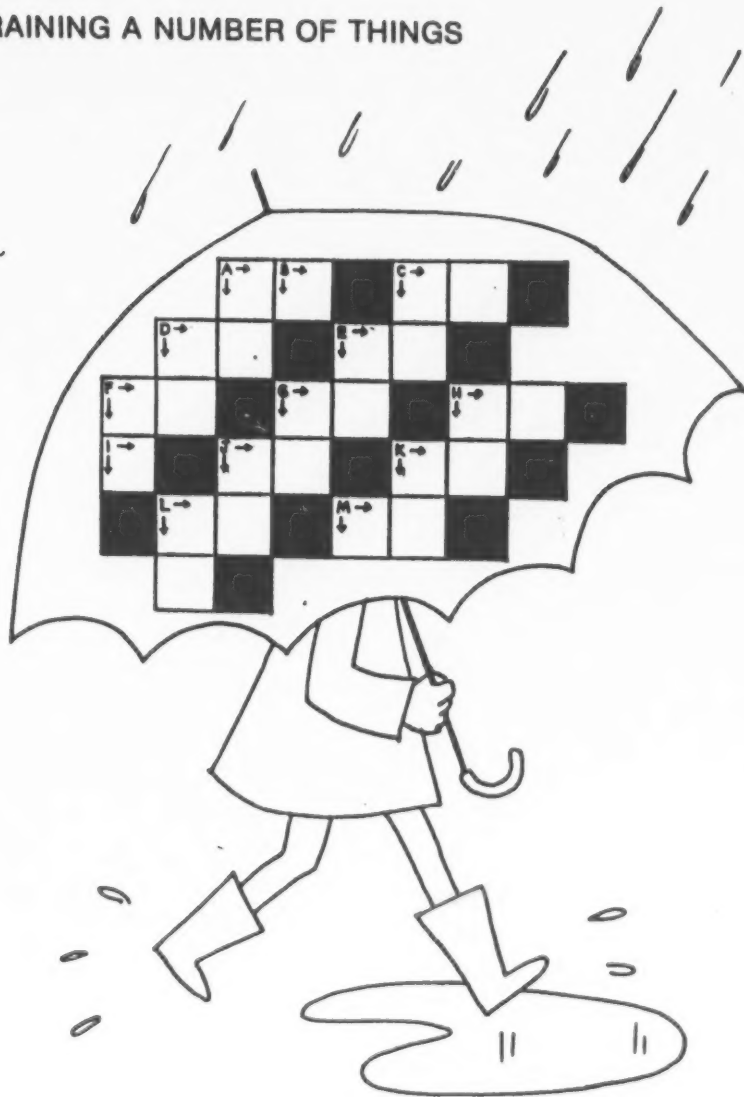
Step 8 Ask for final answer

Step 9 Tell year of birth and age

Solution: The first 4 digits will always be the year of birth; the last 4 digits will always be the age.

APPENDIX F
SAMPLE OF CHILDREN'S ACTIVITY SHEETS

RAINING A NUMBER OF THINGS



Across

- a. 7 x 3
- b. 1 x 1
- c. 2 x 5
- d. 4 x 10
- e. 5 x 7
- f. 5 x 5
- g. 4 x 4
- h. 4 x 6
- i. 1 x 4
- j. 5 x 6
- k. 3 x 6
- l. 4 x 3
- m. 4 x 10

Down

- a. 4 x 5
- c. 5 x 3
- d. 5 x 9
- e. 4 x 9
- f. 3 x 8
- g. 5 x 2
- h. 4 x 7
- j. 4 x 8
- k. 1 x 10
- l. 2 x 7

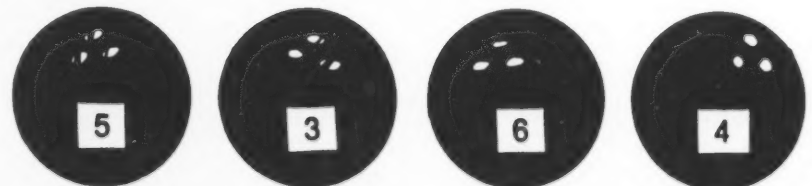
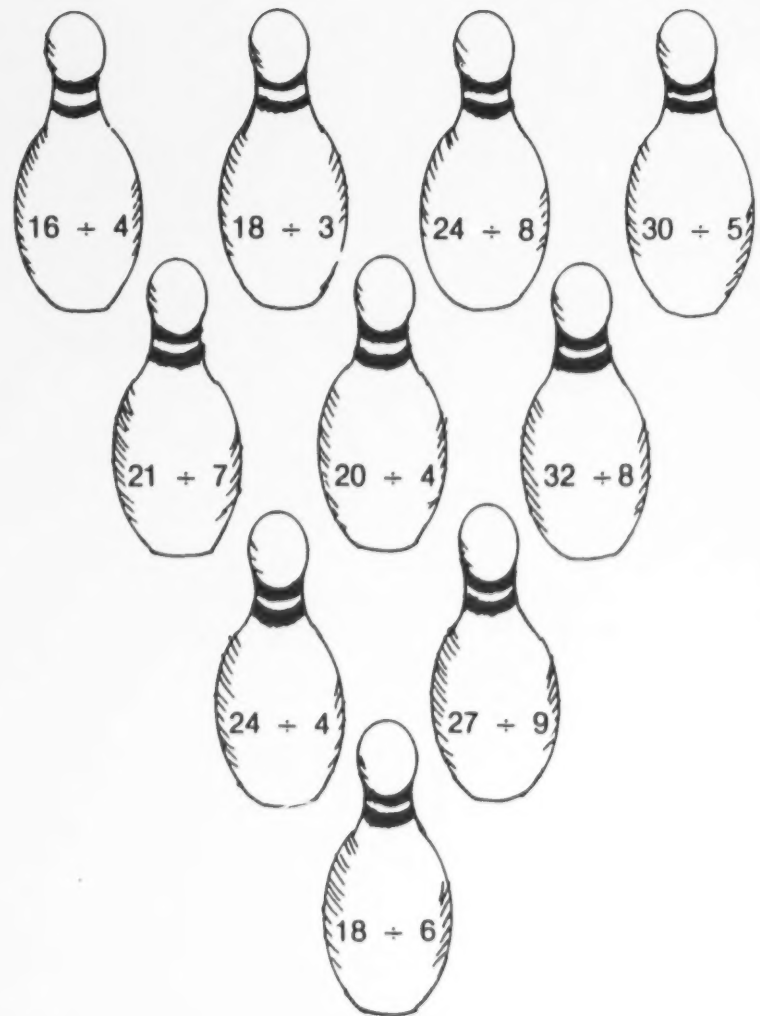
KNOCK THEM DOWN!

These bowling pins and bowling balls are quite unique. Usually in bowling, you can knock down many pins with one ball. In this game, you can only knock down the pins with certain balls.

Each pin has a division example on it. The only way it can be knocked down is if it is hit by a ball whose number is the right answer to the example. For instance, if the pin is $8 \div 4$, it can only be knocked down by a number 2 ball.

Try to see how many pins you can knock down. Then answer the following questions.

1. With which ball would you be able to knock down 3 of the pins?
2. With which ball would you be able to knock down most of the pins?
3. With which ball would you be able to knock down the least number of pins?
4. How many pins can you knock down with the number 4 ball?
5. How many balls would you need for a spare? (One pin left standing.) Which would they be?
6. How many balls would you need for a strike? (All pins down at one time.) Which would they be?



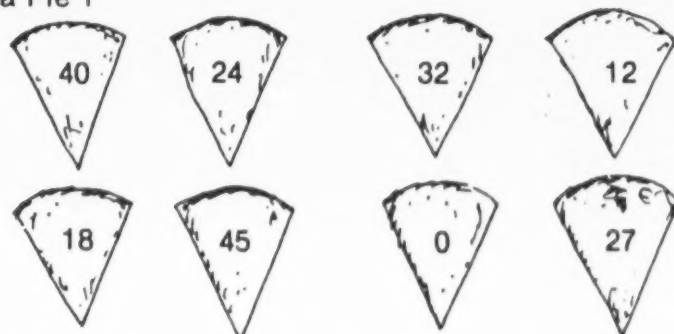
PIZZA PIE RACE

Below are 16 pieces of pizza that belong on the pies to the right. Match the numbered slices to their corresponding number sentences on the pizza pies. One has already been done for you.

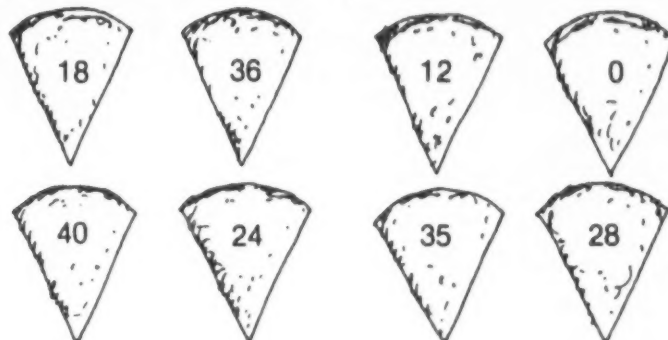
Work this Pizza Pie Race alone or with a friend and see how many slices you can match.

See who can complete a pie first.

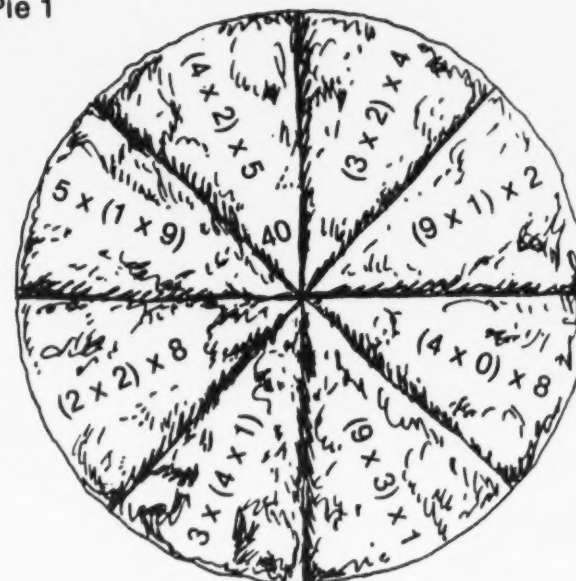
Pizza Pie 1



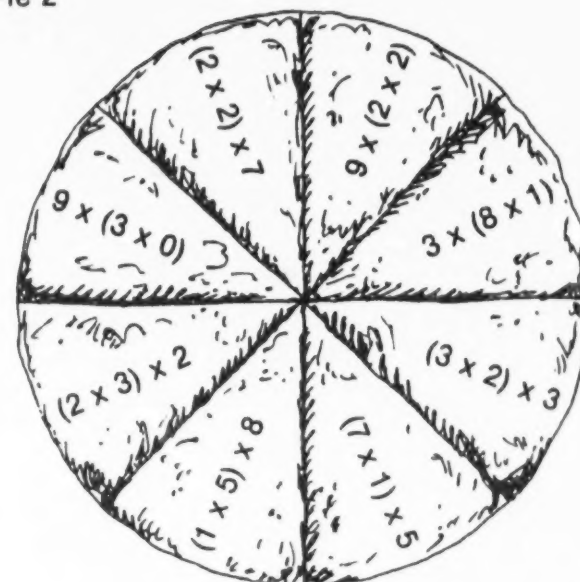
Pizza Pie 2



Pizza Pie 1



Pizza Pie 2



THE XYLOPHONE

The xylophone usually plays music. These xylophones when used properly will give you names of things. Try it and see how many you can get.

Here's how it works.

First, find the quotients to the division examples. Then, find the numbers with their corresponding letters on the xylophone. Each answer spells out the name of something.



1	2	3	4	5	6	7	8	9
T	E	A	L	M	G	O	Y	R

$$5 \overline{) 860}$$

$$2 \overline{) 852}$$

$$4 \overline{) 956}$$

$$2 \overline{) 790}$$

$$3 \overline{) 846}$$

I. Parts of the Body



1	2	3	4	5	6	7	8	9
B	F	D	C	O	T	A	G	X

$$2 \overline{) 952}$$

$$2 \overline{) 716}$$

$$5 \overline{) 880}$$

$$3 \overline{) 777}$$

$$9 \overline{) 531}$$

II. Animals



1	2	3	4	5	6	7	8	9
C	T	H	B	A	R	Y	O	G

$$6 \overline{) 936}$$

$$2 \overline{) 904}$$

$$3 \overline{) 861}$$

$$2 \overline{) 704}$$

$$6 \overline{) 912}$$

III. Playthings

NUMBER RIDDLES

Can you solve these riddles? Follow these simple directions and you will find the answers.

For each letter of the answer, there is a dash. Above the dash, to the left, is a subtraction example with dotted lines next to it. You are to round each of the numbers to the nearest ten, then subtract. After you get the answer, look at the KEY CHART to find out what letter the number stands for. Write that letter on the dash under the example. When you finish doing all the examples you will know the answers to all the riddles. The first one is done for you.

1. What has a head and a tail and no body?

$$\begin{array}{r} 814 \quad \dots 810 \quad \quad 762 \quad \dots \quad \quad 732 \quad \dots \\ -365 \quad -370 \quad -394 \quad \dots \quad -416 \quad \dots \\ \hline \quad \quad 440 \end{array}$$

A

$$\begin{array}{r} 927 \quad \dots \quad \quad 816 \quad \dots \quad \quad 273 \quad \dots \\ -452 \quad \dots \quad -344 \quad \dots \quad -149 \quad \dots \\ \hline \end{array}$$

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KEY CHART

370	180	170	290	310	530	590	480	360	730
P	S	O	H	E	L	W	N	M	C
440	720	580	120	160	280	670	910	880	750
A	I	T	Y	R	B	D	F	U	G

2. What falls down and never gets hurt?

$$\begin{array}{r} 374 \quad \dots \quad \quad 608 \quad \dots \quad \quad 416 \quad \dots \quad \quad 739 \quad \dots \\ -187 \quad \dots \quad -134 \quad \dots \quad -249 \quad \dots \quad -148 \quad \dots \\ \hline \end{array}$$

3. What is round at both ends and high in the middle?

$$\begin{array}{r} 416 \quad \dots \quad \quad 476 \quad \dots \quad \quad 936 \quad \dots \quad \quad 486 \quad \dots \\ -249 \quad \dots \quad -194 \quad \dots \quad -218 \quad \dots \quad -316 \quad \dots \\ \hline \end{array}$$

4. What is the easiest thing in the world to part with?

$$\begin{array}{r} 555 \quad \dots \quad \quad 938 \quad \dots \quad \quad 496 \quad \dots \\ -123 \quad \dots \quad -214 \quad \dots \quad -327 \quad \dots \\ \hline \end{array}$$

$$\begin{array}{r} 567 \quad \dots \quad \quad 468 \quad \dots \\ -213 \quad \dots \quad -194 \quad \dots \\ \hline \end{array}$$

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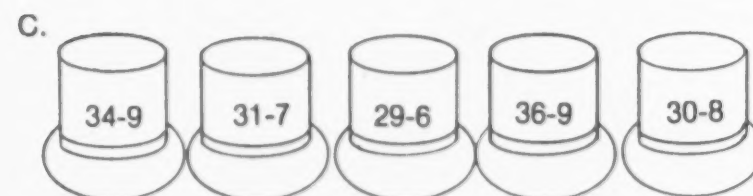
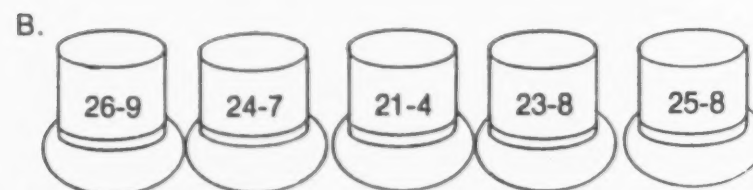
THE ODD HAT

On this card, there are 25 hats. One of them is an "odd" hat, which means it doesn't belong. Can you figure out which one it is?

Follow these directions and you should be on the right track. First do all the subtraction on each hat in Row A. (Write answers in brim of hat). All the answers will have a pattern or sequence with the exception of one. Put a square around the hat that doesn't belong. Then do the same with the other rows.

After you have found the hat that doesn't belong in each row, compare the pattern of the 5 hats to find the "odd" hat of the entire card.

This puzzle is fun to do. You may even want to make your own odd-hat chart. Patterns or sequences may be descending, such as 12, 11, 10, 9, 8, or alternate patterns such as 7, 9, 11, 13, 15 or 1, 2, 4, 1, 2, 4, 1, 2, 4, or 8, 9, 8, 9, etc.



1.	$\begin{array}{r} 30 \\ +10 \\ \hline \end{array}$	$\begin{array}{r} 50 \\ +30 \\ \hline \end{array}$	$\begin{array}{r} 90 \\ +40 \\ \hline \end{array}$	$\begin{array}{r} 70 \\ +20 \\ \hline \end{array}$	$\begin{array}{r} 60 \\ +10 \\ \hline \end{array}$
----	--	--	--	--	--

PUZZLE SURPRISE

Find the answers to all of the examples. When you have finished, follow directions very carefully and see what you have drawn.

2.	$\begin{array}{r} 50 \\ +80 \\ \hline \end{array}$	$\begin{array}{r} 20 \\ +20 \\ \hline \end{array}$	$\begin{array}{r} 30 \\ +40 \\ \hline \end{array}$	$\begin{array}{r} 30 \\ +10 \\ \hline \end{array}$	$\begin{array}{r} 90 \\ +60 \\ \hline \end{array}$
----	--	--	--	--	--

DIRECTIONS

In Row 1, put a ring around the highest answer.

In Row 2, put a ring around the two highest answers. Put an X on each of the two lowest answers.

Repeat this for Rows 3 - 5.

In Row 6, draw a square around the highest answer. Draw circles around the two second-highest answers.

Draw a line from the circle in Row 1 to each of the circles in Row 2.

Draw a line from each of the X's in Row 2 to the circle that is closest in the same row and to the closest circle in the row below.

Repeat this for Rows 3 - 5.

In Row 6, draw a line from each of the circles to the top of the square.

3.	$\begin{array}{r} 80 \\ +50 \\ \hline \end{array}$	$\begin{array}{r} 50 \\ +20 \\ \hline \end{array}$	$\begin{array}{r} 60 \\ +50 \\ \hline \end{array}$	$\begin{array}{r} 40 \\ +50 \\ \hline \end{array}$	$\begin{array}{r} 30 \\ +90 \\ \hline \end{array}$
----	--	--	--	--	--

4.	$\begin{array}{r} 90 \\ +80 \\ \hline \end{array}$	$\begin{array}{r} 40 \\ +50 \\ \hline \end{array}$	$\begin{array}{r} 20 \\ +80 \\ \hline \end{array}$	$\begin{array}{r} 60 \\ +20 \\ \hline \end{array}$	$\begin{array}{r} 80 \\ +80 \\ \hline \end{array}$
----	--	--	--	--	--

5.	$\begin{array}{r} 90 \\ +30 \\ \hline \end{array}$	$\begin{array}{r} 50 \\ +20 \\ \hline \end{array}$	$\begin{array}{r} 30 \\ +60 \\ \hline \end{array}$	$\begin{array}{r} 60 \\ +10 \\ \hline \end{array}$	$\begin{array}{r} 70 \\ +90 \\ \hline \end{array}$
----	--	--	--	--	--

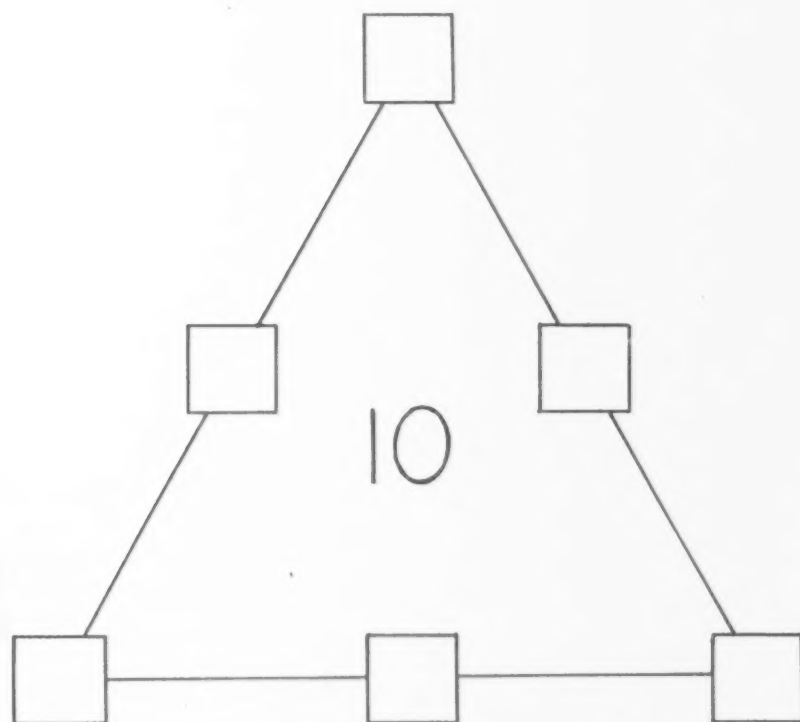
6.	$\begin{array}{r} 80 \\ +20 \\ \hline \end{array}$	$\begin{array}{r} 60 \\ +30 \\ \hline \end{array}$	$\begin{array}{r} 80 \\ +80 \\ \hline \end{array}$	$\begin{array}{r} 30 \\ +50 \\ \hline \end{array}$	$\begin{array}{r} 60 \\ +40 \\ \hline \end{array}$
----	--	--	--	--	--

What picture do you see? _____

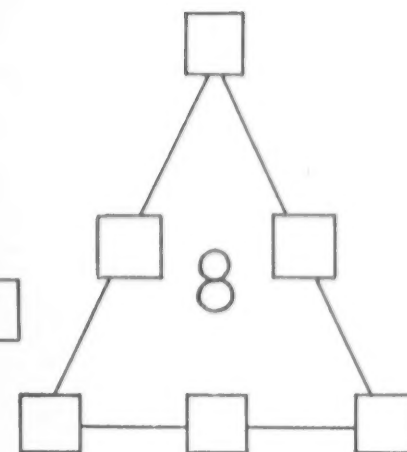
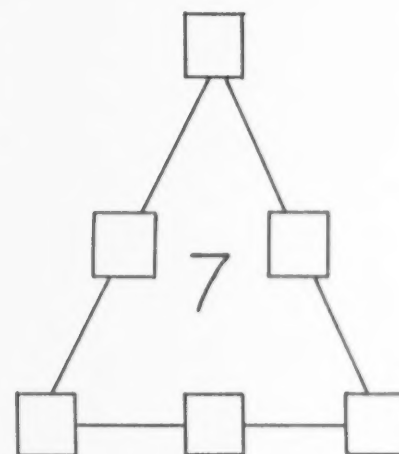
TRIANGLE PUZZLES

Are you good at solving puzzles? Here are a few that are a little tricky at first, but fun, once you discover their secret.

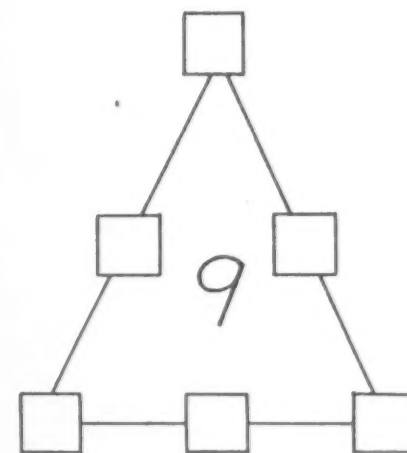
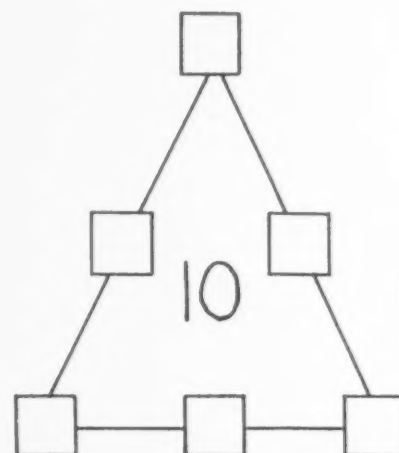
Put the numerals 1 through 6 in the squares so that the three numbers on each side add up to the sum in the center of the triangle.



93



Arrange three numerals, using each one twice, so that the three numbers on each side add up to the sum in the center of the triangle.



94

The sum of the 3 diamonds in each row must be 1,200.

THE 1200 DIAMOND

1. Complete the 7 division examples below.
2. Place the quotients in the diagram, so that the numbers in each row of 3 diamonds — vertically, horizontally, and diagonally — add up to 1,200.

a. $8 \overline{) 4800}$

b. $7 \overline{) 700}$

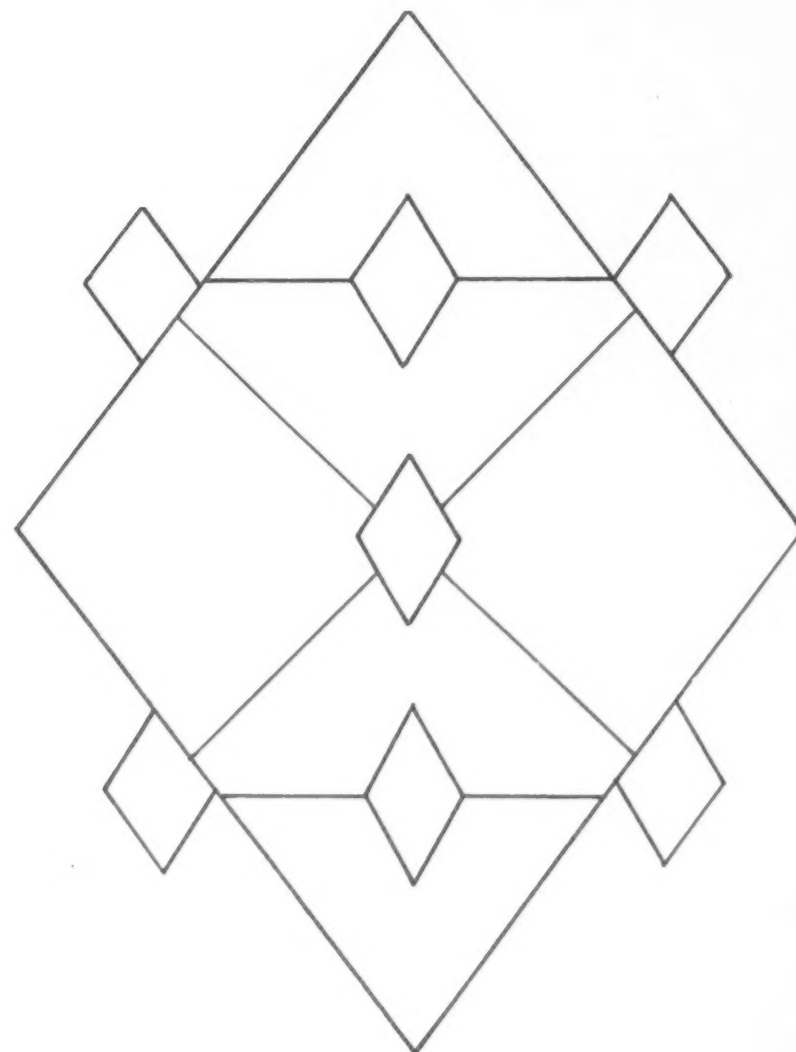
c. $5 \overline{) 2000}$

d. $6 \overline{) 1800}$

e. $9 \overline{) 4500}$

f. $8 \overline{) 1600}$

g. $7 \overline{) 4900}$



APPENDIX G
DESCRIPTION OF GAMES PLAYED

BUZZ

This is a simple counting game, excellent for reviewing multiplication tables and number awareness. It requires concentration and the ability to think. Buzz can be played by an entire class or as few as three persons.

The procedure is as follows: the teacher or student leader selects a number from one to nine to be the factor. Counting is started by one person at a time. Instead of saying the number or its multiple, the player must say "Buzz" in its place. If the player fails to do so, he/she is eliminated. The last player to remain is the winner.

A round would be as follows if the number selected is 4. The count would be: 1, 2, 3, buzz. 5, 6, 7, buzz, 9, 10, 11, buzz, 13, buzz, 15, buzz, 17, 18, 19, buzz, and so on till 39, buzz, buzz, buzz, buzz, buzz, buzz, buzz, buzz, 50, 51, buzz, 53, buzz, 55, buzz. 57, 58, 59, buzz, etc.

This game can be played by using the 3, 4, or 5 multiples for the lower grades and the larger numbers for the higher grades. This is an ideal game to play at home with friends or family members. It is also a good game to play while on a motor trip. Its versatility makes it recommendable.

HUMAN-TIC-TAC-TOE

A delightful game thoroughly enjoyed by all the children. Materials required are: 9 chairs arranged in three rows of three, a set of flashcards of any of the four operations, colored construction paper, one color with X's on it and another with O's (at least nine of each).

Procedure: class is divided into two teams, the X's and the O's. They line up on either side of the tic-tac-toe square (made up of the 9 chairs).

The first person in line X must answer the number fact asked on the flashcard. If the answer is correct, he/she picks up an X card and selects a seat in the tic-tac-toe square, holding the X in front of him/her. If the answer is incorrect, player goes to the end of the line and the next person on the team goes.

After an X is seated, the first person in the O line must answer a math question. If correct, the player picks up an O card and takes a seat. The game continues until one team has three people seated horizontally, vertically, or diagonally as in a paper and pencil tic-tac-toe game.

One point is scored for each completed row. The team with the most points is the winner. This game was played by the third and fourth graders. They loved it and asked if they could play it again at some future time.

PICO FERMI

This is a unique game appropriate for children as well as adults. The writer used it with fifth and sixth graders, as well as with parents at a workshop.

The object of the game is to guess a two digit number selected by the leader or teacher. Player asks if it is ____ (states a number). The answers would be as follows:

Pico If one of the digits is correct but
in the wrong place

Fermi If one of the digits is correct and
in the right place

Bagel If neither number is correct

Game continues with players trying to guess the number. By using logic, the number can eventually be guessed. The object of the game is to guess the number in as few turns as possible. Attention should be called to players not to repeat a number that has been eliminated by the bagel reply so as not to waste a chance.

When the number is guessed, the reply is FERMI FERMI. The person who guessed it correctly chooses a number and starts a new game. This is a thoroughly enjoyable game, interesting, and challenging, and a wonderful opportunity to develop reasoning power.

Sample Game:

Number to be guessed: 25

Number guessed	Reply	Reason
57	pico	5 is correct number but in wrong place
49	bagel	none of the numbers are correct
70	bagel	none of the numbers are correct
28	fermi	2 is correct number in right place
68	bagel	none of the numbers are correct
23	fermi	2 is correct number in right place
21	fermi	2 is correct number in right place
25	FERMI FERMI	

CHIP TRADING

Chip Trading is a fun, yet educational game that can be played by young and old. Excitement and interest level is high. It can be simplified so that lower grade children can participate or made real challenging for the very bright advanced student and adults.

Requirements are a pair of dice and a box of poker chips for every group of players. Groups can vary from four to seven, with five as the ideal number. Several groups can play at one time.

The procedure is as follows: one player becomes the banker; group leader, teacher, or parent decides on an equation and number base to be used. Until players become experienced with the game, it is wise to use the equation $a + b$ which is actually the sum of the two dice. Base five or three is usually best to use at the beginning.

For base five, the following directions would be given:

5 red chips equal 1 white chip

5 white chips equal 1 blue chip

5 blue chips wins the game

Procedure:

First player rolls the dice, adds the numbers of the two dice, states the amount, and asks for the correct number of chips. For example, if a 6 and 2 are thrown,

player says "8" and asks for either 8 red chips or 1 white and 3 red chips. The banker gives the player what was asked if the request is correct. All players watch carefully to be sure transaction is accurate.

Next player then throws the dice and repeats the process. In future turns, before throwing the dice, player may call out "Chip Trading". This means he/she wishes to transact with the banker. The exchange may be 5 reds for 1 white, or 5 whites for 1 blue. After trade is consummated, player then rolls the dice and continues as before.

The winner is the first person to have 5 blue chips. Winner then becomes banker and a new game starts. A different equation may be selected such as $a + b + 2$, $a + b - 1$, $a \times b - 3$, $a + b + c$, (by using a third di), $a + b \times c / 2$, etc. The number of possibilities are quite extensive. The number base may vary depending on the player's abilities. For younger children, base 3 is a possibility; this would be 3 reds equal to 1 white, 3 white equal to one blue, 3 blues would be the winner.

Note: With base 5, the player needs 125 to win, base 3 requires 27. If base 10 were to be used, 1000 would be needed to win. Thus, the smaller the base, the less is required to win and the game ends sooner.

APPENDIX H

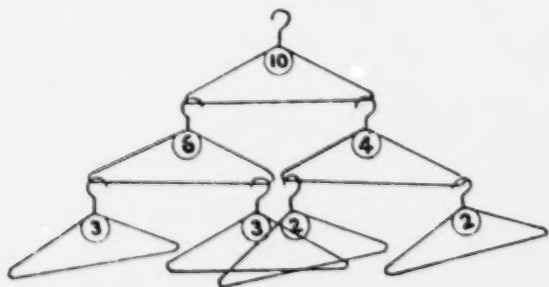
SAMPLE OF ACTIVITY SHEETS DISTRIBUTED TO PARENTS

MATH MOBILES

Materials: wire coat hangers, tape, paper circles, string

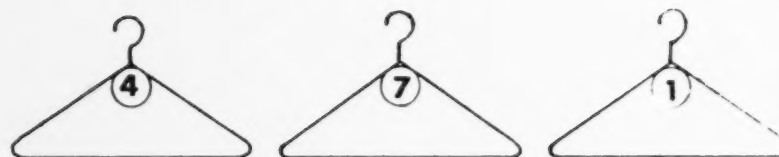
How to make the mobiles:

1. Write a numeral on one of the circles.
2. On two more circles, write two numerals which add up to the first number.
3. Take four circles and divide them into two pairs. On each pair, write two numerals which add up to each of the numbers in Step 2.
4. Tape each of the circles to a hanger.
5. Tape the hangers together to form an addition "chain"—that is, so the numbers on each pair of hangers add up to the number on the hanger above. This is how your mobile should look:



Tie a string to the top hanger and hang the mobile from a light or from the ceiling.

How many mobiles can you make using these numbers on the top hanger?



Try making the mobiles with more numbers and more hangers, too!

TIC-TAC-TOE CODE

Do you like Secret Codes? Well, here's one that is fun to do. The basis for this code is 9 numbers placed in a tic-tac-toe array. From this, you should be able to work out all the examples below. Try it and see how many you can solve.

3	60	80
160	4	320
240	40	2

1. $\square \times \square = \square$

2. $\square \times \square = \square$

3. $\square \times \square = \square$

4. $\square \times \square = \square$
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Now see if you can fill in the answer.

5. $\square \times \square = \square$

6. $\square \times \square = \square$

7. $\square \times \square = \square$

In the next group of examples, be sure to find the product for the numbers in parenthesis; then add, multiply, or subtract as directed.

8. $(\square \times \square) + (\square \times \square) = \square$

9. $(\square \times \square) + \square = \square$

10. $(\square \times \square) \times \square = \square$

11. $(\square \times \square) + (\square \times \square) = \square$

12. $(\square \times \square) - (\square \times \square) = \square$

13. $\square + (\square \times \square) = \square$

14. $(\square \times \square) - (\square \times \square) = \square$

15. $(\square \times \square) + (\square \times \square) = \square$

16. $(\square \times \square) + \square = \square$

Can you make up secret code examples of your own?

BREAK THE CODE

How good a detective are you?

These multiplication examples have letters instead of numbers. You have to BREAK THE CODE by finding out what number each letter stands for.

SAMPLE: $\begin{array}{r} 7\ T\ A \\ \times 2 \\ \hline M\ T\ 8\ 6 \end{array}$ What does the M,
T, and A stand for?

Think:

A must be 3 because $2 \times 3 = 6$; by the same reasoning, T must be 4. The example so far is:

$$\begin{array}{r} 7\ 4\ 3 \\ \times 2 \\ \hline M\ 4\ 8\ 6 \end{array}$$

We know that $7 \times 2 = 14$, so M must be 1.

Hence, the example must be:

$$\begin{array}{r} 7\ 4\ 3 \\ \times 2 \\ \hline 1,\ 4\ 8\ 6 \end{array}$$

By simple reasoning, it is possible to BREAK THE CODE in each one of these puzzles. Of course, they're more difficult than the sample, but they are an interesting challenge.

Q 1 3

Find the value for:

$\times 4\ 6$

S =

1 Q W S

W =

$\underline{S\ 5\ Q\ 0}$

Q =

T W T S

T =

9 T

Find the value for:

$\times P\ 2$

T =

1 9 P

P =

$\underline{Q\ T\ T\ 0}$

Q =

P 0 N P

N =

If you enjoyed these, make up some of your own and try them on your friends.

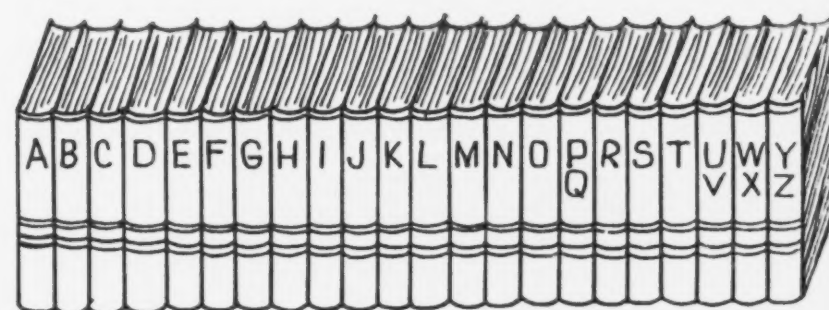
WHERE'S THE MONEY?

In Venezuela there lived a very wealthy old man who had made his fortune in oil. He was a success in the oil business because he spent all his time and energy learning and thinking about oil.

When he died he left a most unusual will. In it he said that his money was hidden in one of the 22 volumes of the *Oil Encyclopedia* that he possessed. The will also contained 22 division examples that each represented a particular volume of the encyclopedia. The quotient from the volume with the hidden money also served as a code. All the oil man's riches would be inherited by the son who first solved the mystery of the hidden money.

On the right side of this card are the examples that the wealthy oil man left as clues. Can you solve the problem? Which volume contains the money? Remember, the answer is written in code and is contained in one of the quotients. See if you can locate the money.

Hint: After you have completed all the examples, turn the card upside down. Look carefully at the quotients for the coded message.

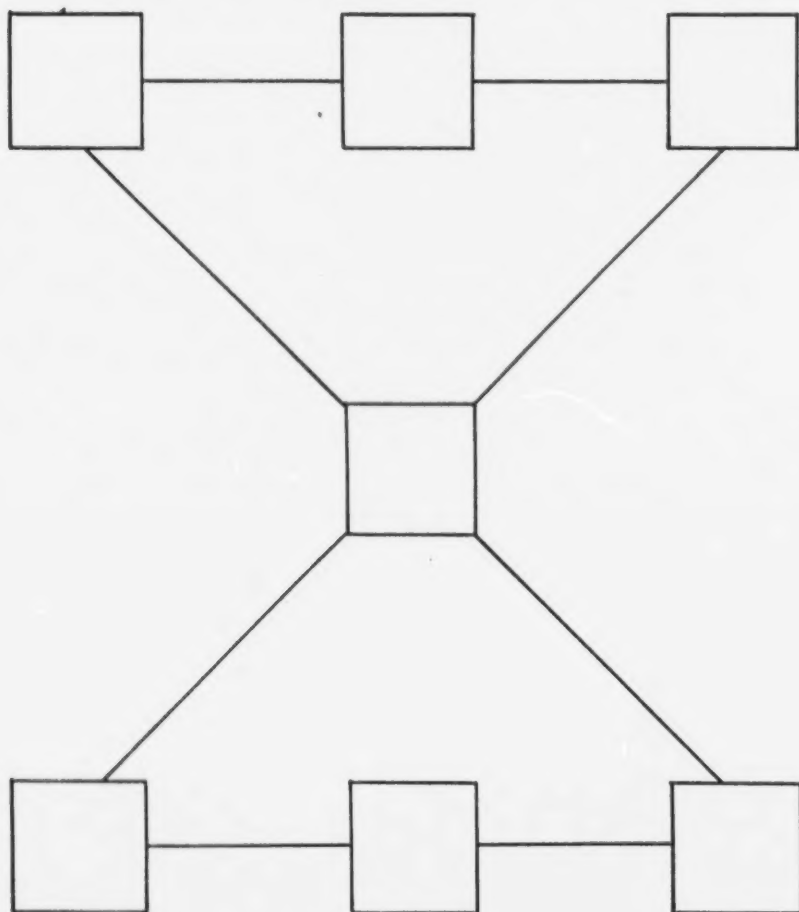


Vol. A	$4\overline{)7392}$	Vol. L	$7\overline{)4704}$
Vol. B	$5\overline{)3845}$	Vol. M	$9\overline{)7236}$
Vol. C	$8\overline{)8032}$	Vol. N	$4\overline{)3056}$
Vol. D	$6\overline{)3716}$	Vol. O	$6\overline{)8198}$
Vol. E	$3\overline{)9054}$	Vol. PQ	$5\overline{)7045}$
Vol. F	$9\overline{)3789}$	Vol. R	$8\overline{)430}$
Vol. G	$7\overline{)4340}$	Vol. S	$9\overline{)6390}$
Vol. H	$5\overline{)9380}$	Vol. T	$3\overline{)8254}$
Vol. I	$2\overline{)7384}$	Vol. UV	$6\overline{)7218}$
Vol. J	$3\overline{)7422}$	Vol. WX	$7\overline{)8694}$
Vol. K	$9\overline{)3808}$	Vol. YZ	$2\overline{)4718}$

Good luck in finding the money!

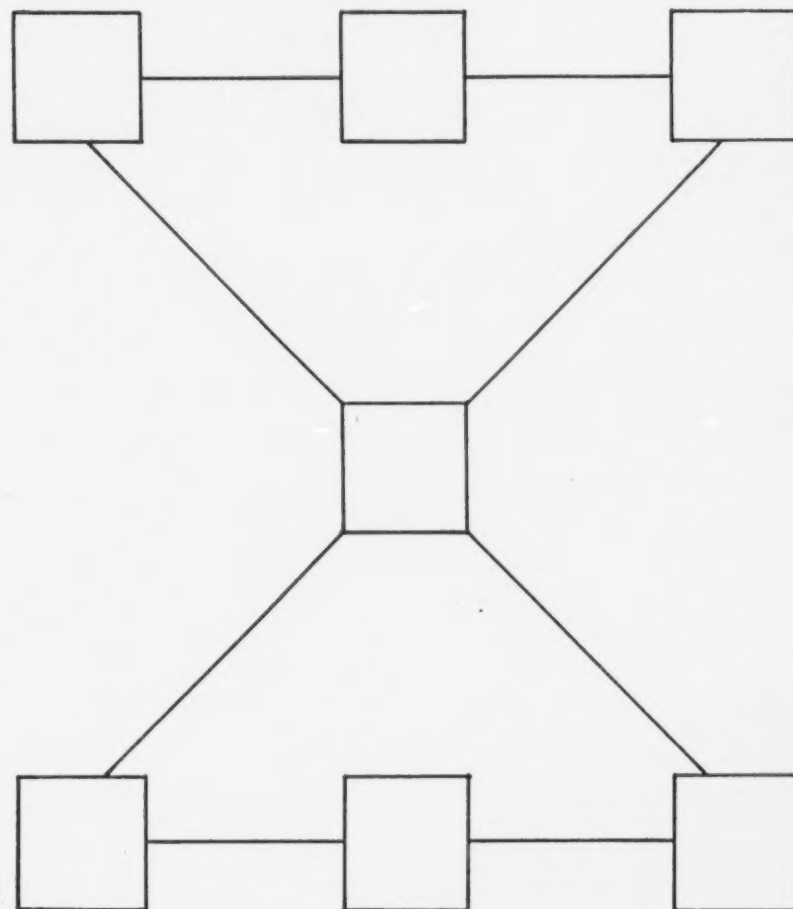
THREE-IN-A-ROW

Arrange the numerals 1 through 7 in the squares in the figure below so that any three squares connected in a straight line add up to 12.



113

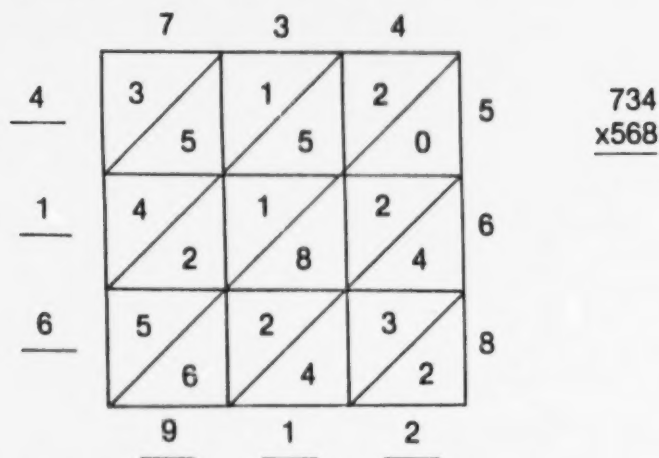
Arrange the numerals 0 through 6 in the squares in the figure below so that any three squares connected in a straight line add up to 9.



114

LATTICE MULTIPLICATION

Lattice multiplication is a unique way of multiplying. It is quite simple. See if you can do it.



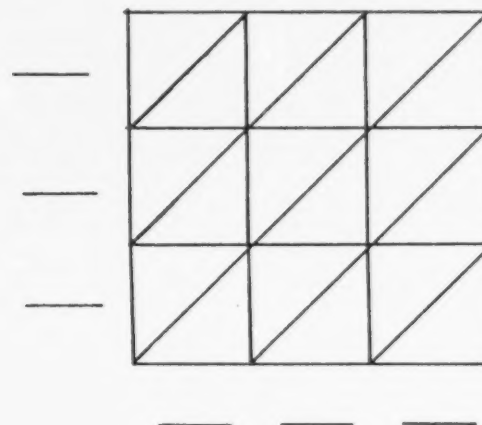
Answer is: 416,912

Write the number to be multiplied on the top and the multiplier at the side. Multiply each number on the top by each number on the side. Place the product in the corresponding box. Write the product answer in the manner of the sample; that is, putting the tens' digit on the top of the diagonal line and the ones' digit on the bottom. When the box is completed, add the figures in the diagonal columns. Start at the bottom right hand corner and move up. Carry the tens' digit to the next column if the answer is greater than 9. You will find the answer to the multiplication example written along the left side and bottom of the square.

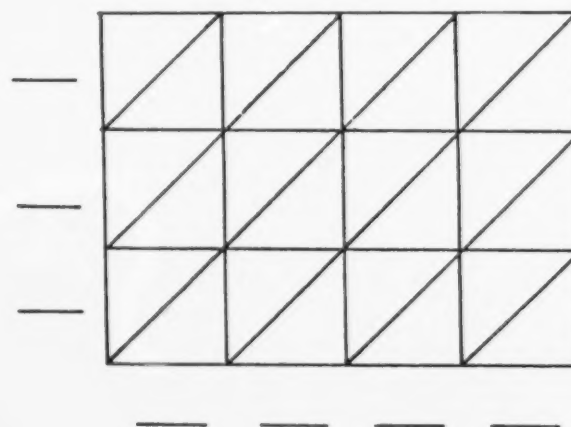
115

Now try these!

$$643 \times 247$$



$$4,079 \times 623$$



116

TRADING TIME



During hobby week, pupils brought their collections to school to show them to others and to trade. Ted, Van, and Ned brought their football player cards. Ted had 97, Van had 75, and Ned had 89.

1. Ned gave Van 6 of his doubles. How many did he have left? _____

2. If Van gave Ted 7 of his 75 cards, how many did he have left? _____

3. After Ted gave Van 8, and Ned 9 of his 97 cards, how many did he have left? _____

Five pupils — Jeff, George, Bob, Jane, and Dot — brought bottle cap collections. George had the most — 94 caps.

4. If Jeff had 7 less than George, how many did Jeff have? _____

5. Bob had 8 less than Jeff. How many did he have? _____

6. Dot had 77, but gave 9 to Jeff. How many did she have left? _____

7. Jane had 53, but gave 8 to Dot. How many did Jane have left? _____



All the students brought in comic books. They decided to fix a room collection and to stack the same kinds of books together. They found they had:

56 funny comics

47 adventure comics

9 comics about cars

8. How many more comics will there be in the funny comics stack than in the car comics stack? _____

9. By mistake someone tore 6 of the adventure comics. How many of these comics were not torn? _____

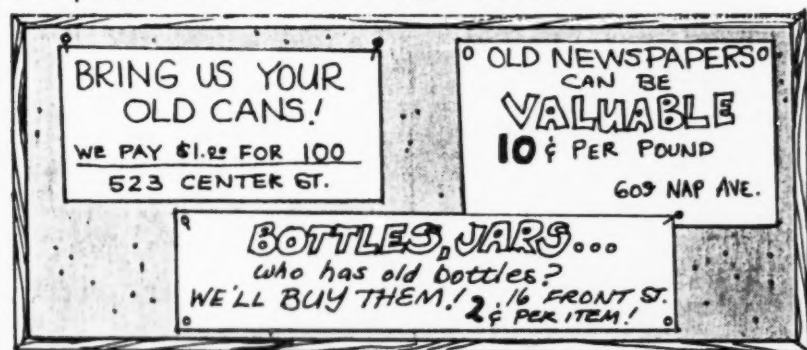
10. Walter decided to take his comics home. He had brought 4 adventure comics, 2 car comics, and 3 funny comics. How many were left in each group?

adventure comics _____ car comics _____

funny comics _____

RECYCLING PAYS

Pete wanted to earn some extra money to buy a birthday present for his mom. He had read in the newspaper about some recycling centers in his town. People were paid for bringing old newspapers, cans, and bottles to the centers. Pete thought this would be a great way to earn money. He cut the three ads from the newspaper and posted them on his bulletin board.



Then he placed three big boxes in the garage to store his collections. Pete decided to set a goal for each collection:

CANS—500 for \$5.00

NEWSPAPERS—452 lbs. for \$4.52

BOTTLES AND JARS—200 for \$4.00

Answer these questions:

1. By the end of the first week, Pete had collected 100 bottles and jars. How many more did he need to find? _____

2. After eight days, he had gathered 121 lbs. of newspapers. How many more pounds did he need? _____

In a month, Pete had collected 200 cans, 455 pounds of newspapers, and 310 bottles and jars.

3. How many fewer cans did he find than he wanted? _____

4. How many more pounds of newspapers does he have than he wanted? _____

5. How many more bottles and jars does he have than his goal for bottles and jars? _____

In all, Pete had earned \$9.65. When Pete was ready to buy his mom's present, he looked at the following things. Find out how much more money he would need or how much he would have left over if he bought each one.

Item	Price	Would Need	Would Have Left Over
necklace	\$8.40		
towels	\$6.13		
ring	\$9.99		
book	\$7.32		
bowl	\$8.50		
pen and pencil set	\$9.86		



THE BIRTHDAY PRESENT

John's brother Timmy was going to have his birthday soon, and John was trying to decide what kind of present he could buy. The first thing to do, he decided, was to find out how much money he could spend; then he would ask Timmy what he wanted for his birthday. Finally, he would go to the store to see if he had enough to buy Timmy something he wanted.

John opened his bank and poured the money out on his bed to count it. He found he had twenty pennies, six nickels, three dimes, two quarters, and one half dollar. How much money did he have?

\$. ____ + \$. ____ + \$. ____ + \$. ____ + \$. ____

After he asked Timmy what he wanted, John took the list to the store and wrote down the prices of each thing on the list:

Firetruck	\$1.00
Teddy Bear	\$1.20
Car	\$.50
Crayons	\$.60
Ball	\$.80
Blocks	\$.90
Chalk	\$.30
Candy	\$.70

How much would the teddy bear and the crayons cost?

_____ + _____ = _____

How much would the ball, the chalk, and the car cost?

_____ + _____ + _____ = _____

How much would the blocks, the crayons, and the car cost?

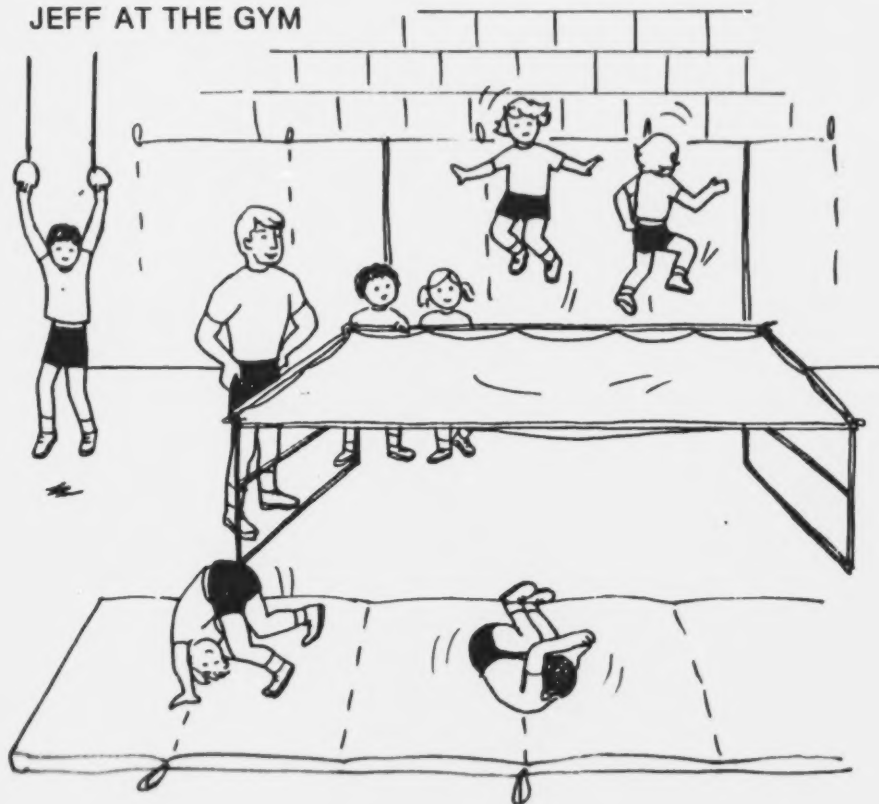
_____ + _____ + _____ = _____

Write down the things John could buy with his money.

Write down the things he could not buy.

What would you buy, if you were John?

JEFF AT THE GYM



Jeff volunteered to help at the school on nights when the gym was open to the public. His job was to supervise a number of activities for younger children. Only a certain amount of people could play a game or use a piece of equipment at a time, so Jeff made up the idea of 15 minute "rounds." After a round was over, everyone had to switch to a new activity to allow others a chance to use all the things. Help Jeff make the plans for the following activities.

1. If only 6 children can play on the tumbling mats at a time, how many rounds must there be to allow 30 children to play?

2. There are 25 children who want to play on the trampolines. If only 5 people can use them during a round, how many rounds would it take to let everybody take part?

3. A total of 27 children wanted to play on the balance beam. Three children are needed for each round. How many rounds will it take to give everyone a chance on the beam?

4. 36 boys and girls wanted to play volleyball. If there are 6 players on a team, how many teams could be formed?

Since 2 teams play against each other in a game, how many games must Jeff organize?

5. A certain folk dance is performed with 4 people in a group. If 20 children wanted to dance, how many groups will there be?

6. 45 children wanted to go swimming. If Jeff set up 5 different pool activities, how many children would there be in each group?

APPENDIX I
MATH CHALLENGES

Math Challenges

The age of a man is the same as his wife's age with the digits reversed. If the sum of their age is 99, and the man is 9 years older than his wife, how old is he?

Answer: _____

The number of two-dollar bills needed to pay for a purchase is 9 more than the number of five-dollar bills needed to pay for the same purchase. What is the cost of the purchase? Answer: _____

In a math contest of 10 problems, 5 points was given for each correct answer and 2 points was deducted for each incorrect answer. If Nancy did all 10 problems and scored 29 points, how many correct answers did she have? Answer: _____

Harry has 21 coins in dimes and quarters. The coins have a total value of \$ 4.05. How many dimes does Harry have? Answer: _____

In the addition problem below A, B, C are digits. If C is placed in the tens column as shown below, the sum is 97. What are the values for A, B, and C?

$$\begin{array}{r} A\ B \\ +\ C \\ \hline 5\ 2 \end{array}$$

$$\begin{array}{r} A\ B \\ +\ C \\ \hline 9\ 7 \end{array}$$

Answer: _____